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The American Urological Association

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AT CHICAGO, ILLINOIS
APRIL 2, 3, AND 4, 1917

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TRANSACTIONS OF THE AMERICAN UROLOGICAL ASSOCIATION.

A NEW METHOD OF LOCAL ANÆSTHESIA IN PROSTATECTOMY.

GUSTAV KOLISCHER AND J. S. EISENSTAED,
CHICAGO, ILL.

It requires no argument to establish the desirability of local anæsthesia in prostatectomy. The anæsthesia, however, must be of such a character as to ensure absolute local insensibility, freedom from physical and mental shock, and an orderly progress of the operative procedure.

From clinical observations and anatomic studies we became convinced that failures in local anæsthesia for prostatectomy were due to a misapprehension of the necessary localization and extent of the infiltration used. Moreover, after frequent use of the technique about to be described, we feel justified in asserting that we have developed a procedure which ensures success in the above enumerated points. Our first efforts were directed to a study of the nerve supply of the prostate gland and contiguous structures, especially of the topographic relations. Anatomic studies were carried out in the anatomic laboratory of the Northwestern University Medical School by the courtesy of Professor Ransom.

The sensory nerves of the prostate gland are derived from the prostatic plexus, often a prolongation

of the vesical plexus, which lies chiefly on the sides of the gland between it and the levator ani muscle. Each of the parts, right and left, supplies the prostate and prostatic urethra and sends offsets to the neck of the bladder and to the seminal vesicles. This plexus is made up of nerves of considerable size, which are derived chiefly from the sympathetic system through the pelvic or inferior hypogastric plexus, and from branches of the sacral ganglia and visceral branches by way of the pelvic splanchnics, from the second and third or third and fourth sacral spinal nerves. The vesical plexus presents on either side of the bladder, on a plane with the intramural portion of the ureter, a flat ganglion, from which emanate several ramifications, which perforate the bladder wall, surround the vesical end of the ureter, the prostate and seminal vesicles, and form around each of these organs a secondary plexus, in the center of which are several ganglia, some of the branches of which may be traced across the prostate, the adjacent urethra to the posterior part of the corpora cavernosa.

Based on these anatomic considerations the technique used is as follows: About fifteen minutes prior to starting manipulations connected with the operation a full dose of morphine is administered hypodermatically. This not only does away with the mental excitement of the patient, but also obtunds the perception of the discomfort connected with the insertion into the rectum of a rubber bag and the distention of the bladder by injecting into it a 2% protargol solution containing 4% of antipyrine. As soon as the patient becomes somewhat somnolent the infiltration anæsthesia is started. Its first step is the flooding of the periprostatic plexus, which as a rule may be accomplished by injection through the perineum. A Record syringe armed with a needle 8 to 10 cm. in length is used for this purpose. In order to guide the needle,

one index finger is inserted into the rectum, the palmar surface facing the pelvic wall. The perforation of the skin is made laterally to the raphe halfway between the anus and the root of the scrotum. The lateral deviation of the needle from the median plane is determined by the palpatory findings demonstrating the extent of the prostatic tumor, the aim being to bring the point of the needle in close proximity to the plexus on either side of the prostate. At least 3 c.cm. of Schleich solution are injected on either side. Then follows the anæsthetizing of the abdominal integumenta. It is insufficient merely to raise in the skin a linear wheal only extending over the linea alba. It is imperative to infiltrate the line of the incision and the adjacent area in herring-bone fashion, because the structures close to the incision have also to be desensitized in order to prevent the perception of pain excited by the insertion of retractors. The same procedure has to be carried out in infiltrating the subcutaneous and subfascial tissues. After the anterior aspect of the bladder with the adherent peritoneal reduplication has been exposed, the infiltration must follow the line of the peritoneal attachment to the bladder wall. Only in this way the stripping off of the peritoneal fold will be made painless. Now the bladder is opened and the success of the perineal flooding of the periprostatic plexus is tested by exerting traction on the prostatic tumor by means of a vulsellum or a tumor screw. If this perineal flooding has accomplished its purpose, then the pulling on the prostate or the stretching of the posterior urethra will cause no pain whatever. It may also be mentioned that this complete anæsthesia is accompanied by a blanching of the mucosa covering the prostate.

In case the aforementioned manipulation should cause any pain, the proof is furnished that the periprostatic plexus has not been reached, and therefore

the anæsthesia must be completed by flooding these nervous centers from within the bladder. This is carried out in the following way: The needle perforates the bladder wall from within at a point located on a line drawn from the ureteral opening on either side to the internal urethral orifice. The direction of the needle is forward, outward, and somewhat downward to ensure again the blocking of the prostatic nerve plexus. The quantity of anæsthetizing fluid used is the same as used in the perineal injection.

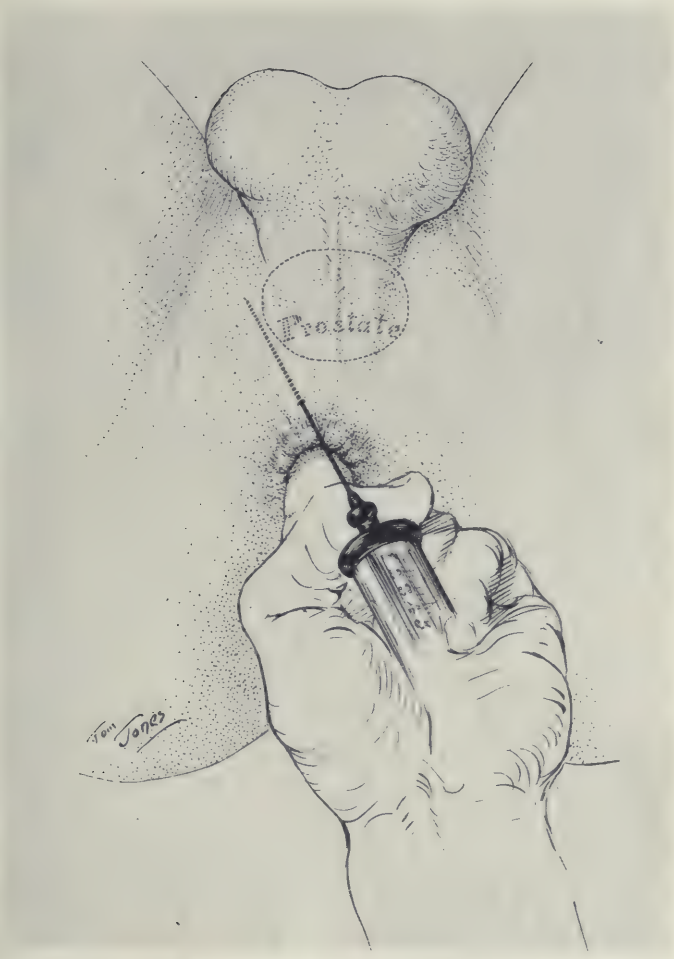

Fig. 1.

Insertion of the needle through perineum under control of finger in rectum.

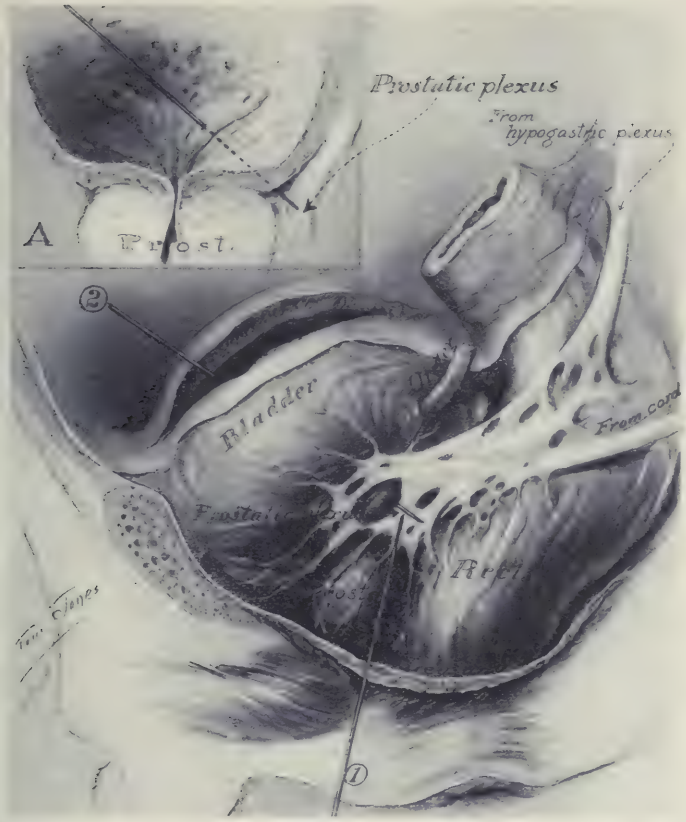

Fig. 2.

Illustrating the topographic relations of the prostate, ureter, bladder, and nerve plexus with needles in position. Needle No. 1 is the needle shown in Fig. 1, as entering the perineum. Needle No. 2 is the needle as shown in insert A, and is employed when the infiltration from perineum has been insufficient or incomplete.

Note that this needle pierces bladder wall at a point along a line drawn between ureteral and urethral orifices.

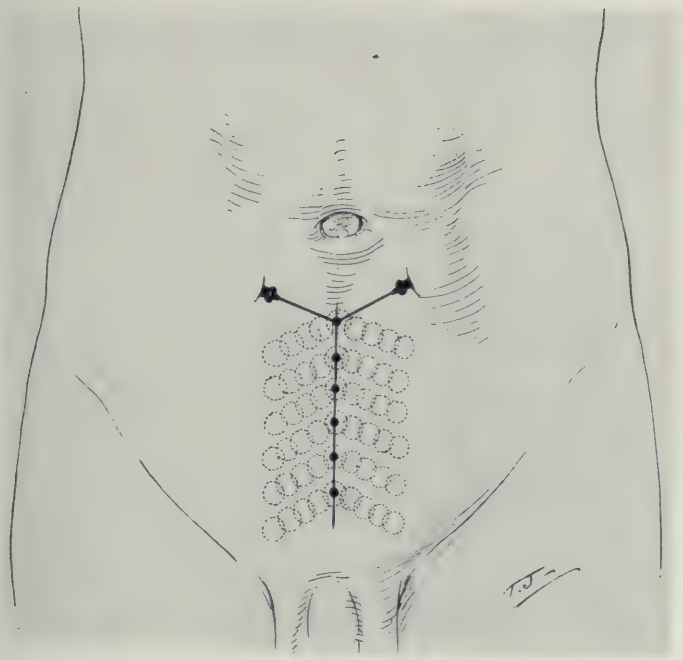

Fig. 3.
Herring-bone infiltration of skin.

Fig. 4.

Line of infiltration controlling the attachment of the peritoneum to the bladder wall.

CHRONIC SURGICAL PROSTATITIS.

B. A. THOMAS,
PHILADELPHIA, PA.

The incidence of prostatitis as a common complication of gonorrhœa, its frequent association with spermatocystitis, the prevalence of mixed infection, the disappearance of the gonococcus and the perpetuation of the disease by other pathogenic bacteria, the complex and obstinate symptomatology, the guarded and often gloomy prognosis due to the refractory nature of the affliction and its proclivity to recrudescences on the suspension of treatment, and the morbidity of the disease, are facts too well known to justify narration.

The objects of this communication are to record certain noteworthy observations on cases of chronic prostatitis treated during the past year and to offer a plea in behalf of operative treatment for definitely selected types of this disease.

There are very few text-books on urological diseases that even mention the propriety of surgical intervention in the treatment of chronic prostatitis, much less its necessity, if we would permanently relieve or actually cure a small percentage of these troublesome cases. Obviously, neither prostatic abscess nor acute or sub-acute parenchymatous prostatitis, characterized by miliary abscesses for which Alexander[1] recommended and performed prostatectomy, should be

[1] Alexander. Observations upon the Pathology of Prostatic Abscess and Operative Treatment. *Annals of Surgery*, Philadelphia, 1909, XLIX, pp. 533–43.

included in this surgical group. It is alleged that prostatectomy for chronic prostatitis was first reported by Albarran[2] in 1900, although I have been unable to confirm this statement. Since then LeFur,[3] Göbell,[4] Zuckerkandl,[5] and Young[6] have performed this operation with brilliant results.

It is emphasized and will be remembered that the average case of chronic prostatitis proceeds to a satisfactory recovery by virtue of the well-known and time-honored conservative therapeutic measures, and that prostatectomy should be reserved for those exceptional cases, the symptoms, pyogenic, urinary, or nervous, of which fail to manifest satisfactory improvement under palliative treatment. I am inclined to believe, however, that not infrequently these cases are temporized with and might be more effectively handled surgically. Certainly an appreciation of the irreparable pathological state of the prostate when chronically inflamed, commonly leading to a progressive tissue destruction and cicatricial contractures, permits of grave doubts as to the possibility of normal tissue restitution. Indeed there is just about as much hope of this as there is expectation of cellular recovery in suppurative pancreatitis.

Aside from a negligible mortality rate, the factors instrumental in restraining surgeons from prostatectomizing these cases more extensively, may have been the possibility of resultant sterility and impo-

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[2] Albarran. Traité de chirurgie et opératoire, by LeDentu and Delbet. Vol. 9, Article Prostata, p. 519, Paris, 1900.

[3] LeFur. Des prostatites chroniques et de leur traitement. VI Session de l'association française d' urologie, Paris, 1903, p. 487.

[4] Göbell. Die Erkrankungen der Prostata. Die deutsche Klinik am Eingange des 20 Jahrhunderts, Bd. 10, Abt. 1, p. 309, 1904 (Kieler Chirurgische Klinik).

[5] Zuckerkandl. Exzisionen aus beiden Lappen der Prostata wegen chronischer Prostatitis. Sitz. d. Wiener Gesellsch. d. Arzte, 4 Dez. 1903. Wiener klin. Wochenschr, 1903, No. 50, p. 1412.

[6] Young, Geraghty, and Stevens. Johns Hopkins Hospital Reports, Vol. XIII, 1906, pp. 331–41.

tence—consequences of some moment to a young man. Sterility should not be accorded too serious consideration, since many of these patients are already sterile owing to their long standing and ofttimes repeated venereal infection. The wife of one of the four cases of prostatectomy for chronic prostatitis reported by Young, Geraghty, and Stevens, subsequently bore a child. Likewise impotence is not infrequently a sequel of progressive, obdurate prostatitis, and therefore no contraindication, necessarily, to a well-performed perineal prostatectomy. Moreover, sociologically, in some of these cases of chronic pyogenic prostatitis, the future holds in store for the prospective wife a worse fate than impotency of the male. Irrespective of the above mentioned sequelæ, there are certain cases of the urinary and nervous types in which surgical intervention is imperative, and no hesitancy need be felt relative to minor undesirable operative results.

In addition to the usual chronic diffuse and nodular forms of this affection, characterized by pus in the prostatic secretion and the presence or absence of various pathogenic bacteria, not to mention the harassing urinary and neurological phenomena, experience recently has revealed to me a necrotic type, unassociated with any palpable enlargement, asymmetry, or abnormal tenderness of the gland. Illustrative of this form of chronic prostatitis, for which apparently prostatectomy has been followed by remarkable results, the appended case history is submitted:

B. F. B., aged 57. Referred by Doctor L. M. Allyn, Mystic, Conn., was admitted to the Polyclinic Hospital, October 17, 1916, with the following history. The patient denies venereal disease, but states that during an attack of measles at the age of thirty-two, he had complete retention of urine, requiring catheterization, and presumes that he was infected at this time. In any event nineteen years ago he was the victim of

epididymitis with pyuria, and three years later first noted a stinging sensation at the end of the penis, most marked just before urination. Four years prior to admission the patient's symptoms became more aggravated and constant; he was unable to empty his bladder completely; frequency developed, then retention at times, and he began to catheterize himself. The family and previous medical history is essentially negative. In spite of urinary antiseptics, by his local physician, his symptoms grew irregularly worse and three years ago he was referred for cystoscopy. Urinalysis revealed much pus, calcium oxalate crystals, an occasional erythrocyte and a faint trace of albumen. The prostatic secretion contained a few extracellular cocci and bacilli. The patient was twelve pounds under weight; he felt tired and depressed, but his organic condition generally was excellent. All blood tests were negative. At this time the prostatic right lobe, per rectum, felt a little larger and boggier than the left and slightly larger than normal; a nodule of the left lobe was tender. The cystoscope showed a diverticulum, one centimeter in diameter, on the left lateral wall of the bladder. This, also, the trigonum and vesical sphincter, demonstrated a state of chronic inflammation. The posterior urethra exhibited a low-grade inflammation. A diagnosis of chronic prostatitis, cystitis, and diverticulitis was made, and the patient was sent home with instructions for urinary antiseptics, massage, and local irrigations.

Periods of temporary improvement in health were followed by frequent recurrences of previous symptoms steadily becoming more aggravated. During the past year frequency and urgency have been present every one to one and a half hours by day and three times at night. Vesical tenesmus and strangury have been excruciating and moreover intensified by the repeated catheterizations which the patient was obliged to

perform. When the desire to urinate occurred, he suffered the greatest agony, sometimes writhing in almost unbearable torture on the bed, clutching his genitalia in despair. Melancholia was mingled with desperation, and on more than one occasion he was suspected of suicidal intentions.

At the time of his admission to the Polyclinic, cystoscopy showed the cystitis and diverticulitis to have subsided. The prostate was normal in size, symmetrical and not abnormally sensitive.

The *index of elimination* of indigocarmin was found to be in the positive phase, namely 1.5, indicating a satisfactory functional state of the kidneys, and in desperation, with little expectation of finding much wrong with the prostate, and therefore little hope of materially benefiting the patient, as a last resort perineal prostatectomy was advised and performed October 28, 1916. Aside from the usual rectangular perineal incision employed by the author (Fig. 1), the technique for conservative prostatectomy so well described and practiced by Hugh Young was followed. Bilateral incisions into both lobes of the gland, which externally appeared quite normal, revealed on the left a dark brownish mass of soft juicy consistency, obviously in a state of advanced necrosis; on the right the normal prostatic tissue was studded by three or four pea-sized necrotic foci similar to the diseased tissue of the left side (Fig. 2). The small lobes were readily enucleated or erased, the vesical orifice forcibly dilated digitally, a drainage tube placed in the bladder, the lobe cavities packed, the perineum repaired and the wound closed. The tubular drain was removed in two days, the packing on the fourth day, and the cutaneous sutures on the sixth day. The patient was out of bed on the fourth day. He passed some urine per urethram on the fifth day and all urine naturally on the ninth day. He walked to

the bathroom also on this date and was allowed to return home on the eighteenth day. At the time of his discharge this patient was urinating with normal frequency and with absolutely no discomfort for the first time in many years. Moreover, his urine was essentially free from pus. Recent advices from him state that he continues to be free of noteworthy urinary difficulties.

Aside from Alexander's acute or sub-acute parenchymatous cases with small abscesses, and Young's chronic interstitial or parenchymatous cases with the usual cellular infiltration associated with cicatricial changes and more or less suppuration, epithelial desquamation and distention of the acini and closure of the ducts, there is no description of the precise pathological state found in the few cases of prostatitis for which prostatectomy has been performed. Therefore the case described by the author and characterized by a definite necrotic condition of the chronically inflamed prostatic tissue is unique from the pathological standpoint, and merits report aside from the excellent clinical result obtained by prostatectomy.

The second type of chronic prostatitis, in which surgical measures seem to be required for a complete cure, and to which attention may be appropriately directed, are those cases of long duration, characterized by definite hyperplastic, polypoid, cystic, or papillomatous changes of the mucous membrane of the posterior urethra and vesical orifice, or by papules or nodules occasioned by prostatic or periprostatic inflammation, involving the submucosa and mucosa. These small tumors are frequently multiple; they are a cause for and aggravate urinary symptoms and by virtue of this common association with chronic prostatitis, in the opinion of the writer, may be relegated to that disease in explanation of their origin. Such patients on posterior urethroscopy exhibit definite tissue

changes, as above described, and demand in conjunction with or subsequently to the treatment of their prostatitis, certain intraurethral procedures of a surgical nature, of which fulguration or high-frequency sparking promises to be the best and has been attended by excellent results in three cases, brief histories of which are submitted.

J. G. R., aged 50. Was referred by Doctor C. C. Corson of Germantown, November 9, 1915, complaining of frequent urination night and day for five years. He admitted having two attacks of gonorrhœa twenty years ago. The first urine was clear but contained several suspended flocculi; after prostatic massage it appeared cloudy and the microscopical field was loaded with pus. On palpation the left lobe of the prostate was slightly enlarged; the right normal, save for a tender nodule the size of a buck-shot; the base of the gland could not be well defined. The cystourethroscope evacuated 170 cubic centimeters of residual urine and displayed at the vesical orifice anteriorly, four or five smooth, soft nodules projecting from the musosa (Fig. 3).

It was decided first to destroy these nodules, then to treat the chronic prostatitis. Four treatments with the Oudin electric spark at weekly intervals sufficed to accomplish this result, after which massage, irrigations, dilatations, and other anti-prostatic measures, practiced for nine months, were rewarded by an apparent cure.

I. R., aged 40. Was referred by Doctor A. B. Hirsh on June 23, 1916, complaining of "threads in the urine." He had experienced several attacks of gonorrhœa, the first twenty years and the last five years ago. His symptoms dated back ten or twelve years and were complicated by premature ejaculations, preventing marriage. Three years ago he was treated for two years by genito-urinary specialists and for the last five

months had his prostate treated by electricity. The urine contained shreds loaded with pus cells. Per rectum the prostate felt normal in size, though slightly soft and infiltrated over the right basal angle. Cystourethroscopy demonstrated a few soft nodules and polypi from the vesical sphincter anteriorly, projecting into the urethra (Fig. 4). Two treatments by fulguration completely cleared the vesical orifice of these growths or nodules. Subsequent massage, irrigations, and topical applications of silver nitrate for three months entitled the patient to a clean bill of health.

G. B., aged 27. Was referred to the Genito-urinary Department of the Polyclinic Hospital on March 9, 1917 by Doctor Frankhauser of Coatesville, Penn. The patient had been afflicted with a urethral discharge for three years, associated with a morning drop at present and some frequency of urination. Rectal examination showed the prostate to be normal on palpation, but slight infiltration in the region of the left seminal vesicle and definite induration of the right vesicle. Cystourethroscopy revealed two large and a number of smaller polypoid, cystic, or inflammatory formations situated in the prostatic urethra (Fig. 5); also an enlarged and chronically inflamed colliculus seminalis, with considerable congestion and inflammation of the posterior urethra. Two treatments by the high-frequency spark have destroyed at least half of these tumors. The patient is still under treatment but already admits improvement in his condition.

In reviewing this subject in the light of the above case reports, the following points in the treatment of chronic prostatitis stand out conspicuously:

1. Chronic prostatitis may be, and is at times a surgical disease, requiring prostatectomy for its most efficient treatment.

2. Chronic prostatitis is not infrequently associated with hyperplastic, polypoid, papillary, or

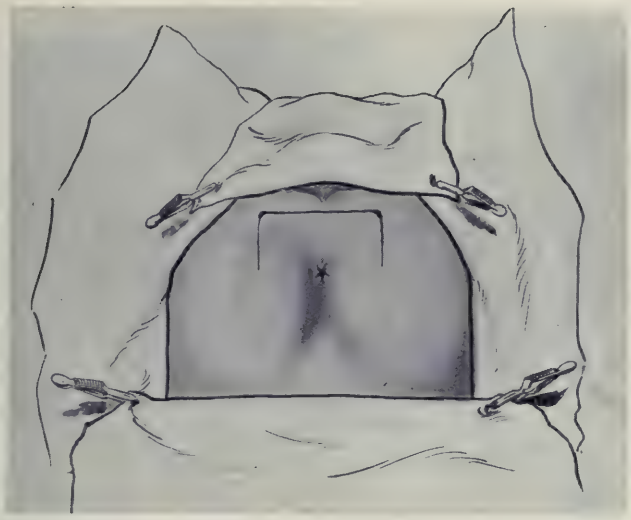

Fig. 1.

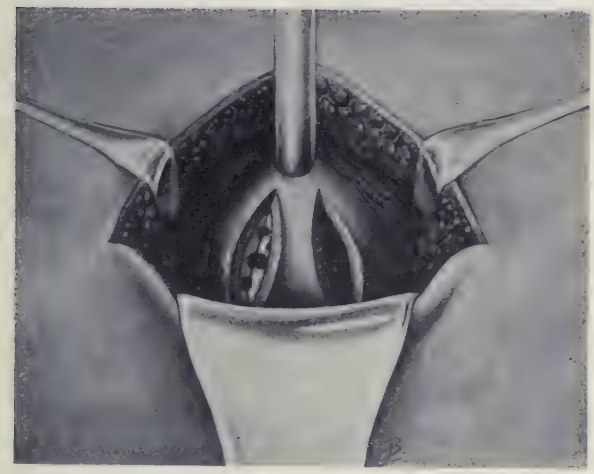

Fig. 2.

Fig. 3.

Fig. 4.

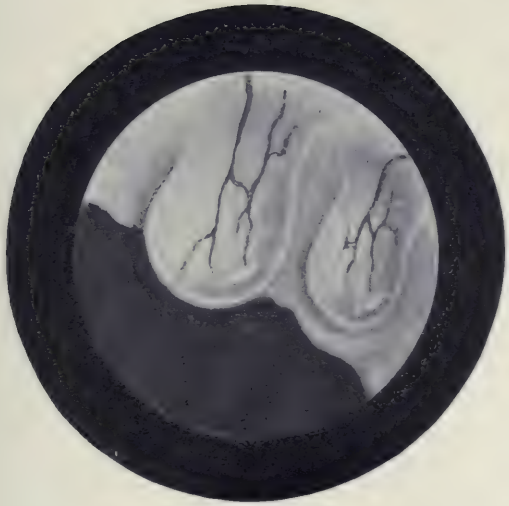

Fig. 5.

nodular formations of the mucosa of the prostatic urethra and vesical orifice, demanding removal by treatment coincident with that directed to the prostate.

3. Fulguration or the high-frequency spark promises to offer the best method of intraurethral treatment for this purpose.

4. In protracted cases of chronic prostatitis, cystourethroscopy is always indicated and may be obligatory for proper diagnosis and treatment.

DISCUSSION

OF PAPERS OF DRS. DAKIN, KOLISCHER AND EISENSTADT, AND THOMAS.

DR. O. S. FOWLER, Denver: I would like to say a word in reference to the use of novocain by the infiltration method as used by Drs. Kolischer and Eisenstadt. The method I use amounts to the same thing. If you will consider the prostate as a ball, and inject the lower half from the perineal side, keeping your finger in the rectum as a guide to where you are injecting the posterior part, you can feel the needle just through the mucous membrane of the intestine; if you will do that and fill the lower half of the prostate well, it will be completely anæsthetized. I open the bladder above in the ordinary way. Usually I do not use any anæsthetic in the bladder. After opening the bladder, and with the left forefinger as a guide, I carry the needle down and inject the upper half of the prostate through the mucous membrane of the bladder. Then you can go ahead with the prostatectomy as if the patient were under a general anæsthetic. It works extremely well. I have seen shock in only one out of more than thirty cases that I have done this way. The last case, which was done a few days ago, showed some shock and a rapid pulse, but he soon recovered from it, and that is the only time I have seen any shock with infiltration anæsthesia. Now a good deal has been said against local anæsthesia. As I have said before, nothing can be said against local anæsthesia, but a good deal can be said against attempted local anæsthesia, and unless you get anæsthesia you are not liable to succeed with your operation. As to spinal anæsthesia as used by Dr. Dakin, — I have had experience in four cases, the only four in which I have used it. I did not inject it myself. Dr. Carl Parsons of Denver injected them. All four cases died, three of

them positively from the spinal anæsthesia. Stovain was used. In two of the cases the blood pressure dropped, while the patients were on the table, to between eighty and ninety, and it looked as though the patients were going to die on the table. Those two cases died the following day without having regained the normal blood pressure. I was satisfied to give up spinal anæsthesia after that record. Other men have reported very excellent results, but I am afraid of it, and inasmuch as the prostatic region can be so easily anæsthetized by infiltration, which is perfectly safe, I prefer that method.

DR. FRANKLIN R. WRIGHT, Minneapolis: I haven't much to say regarding local anæsthesia in prostatic cases, because I have never used it. I have used spinal anæsthesia. Dr. Fowler has spoken of spinal anæsthesia, and I want to tell you of my own experience. I have used it in about 125 cases, with one death. That case which died was the only one in which I used anything excepting tropococain. In that case I used 1 and 1/10 per cent novocain, and the patient died in twenty-four hours from novocain poisoning. I have had but one untoward result. This man was eighty-seven years old, and when he was going off the table he began to yawn. We gave him artificial respiration for thirty minutes. I have had one case of hemorrhage following, and have discovered in these cases where the tissues are blanched that if you give 1/20 grain of strychnine promptly there is no more hemorrhage than usual in these cases. I have frequently seen them put back to bed with the same pulse as they had when they came to the operating room. I think this form of anæsthesia is justifiable in these cases where you are dealing with decrepit old men.

DR. CHARLES E. BARNETT, Fort Wayne, Ind.: I think the subject of local anæsthesia in prostatectomy will be worked out as we go along. However, it is a personal equation now and each man must work out his own technique. For instance, I use a cocain solution, and succeed better than if I used a novocain. However, I look upon cocain itself as more of a hazard than novocain. The question of anæsthetizing the hemorrhoidal portion, with its extensive circulation — the bottom of the prostate, is quite an important one. In your caudal anæsthesia you do not get it. Zuckerkandl a number of years ago tried to do that and failed. So it appears to me just now that we will not be successful in anæsthetizing the prostate completely. However, a short time in which a general anæsthetic has to be given does not add

materially to the danger of the operation. I believe that the men who are now using general anæsthesia entirely, and think that they are doing the best for their patient are making a grave mistake in their prostatectomies.

DR. JAMES A. GARDNER, Buffalo: I earnestly endorse what Dr. Dakin has said about the two-step method. I believe thoroughly in it, and I wish to congratulate him on the results he has obtained. He mentioned one thing, however, that comes very close to my heart, that is, overlooking a median lobe that dropped into the bladder and was subsequently passed per urethra. I had a similar experience within the last two months. An old gentleman was having considerable bleeding when he came to us. We did the primary step and put in a Pezzar catheter for drainage. He was one of those lean old men in whom it is very easy to enucleate the prostate, and it was done in three or four minutes. It seemed a very simple case. His convalescence was uneventful, but when the wound closed he could not pass his urine. Then our troubles began. I never experienced so much difficulty in making a diagnosis. On cystoscopy I could clearly see a papilloma and was not sure but what it was cancer. We did various things, and finally opened the bladder and found loose in it a median lobe which had been overlooked. I do not recall any case which caused me so much worry; a case which should have been so easy to do but which gave so much trouble afterward. I emphasize this point so that others will be careful not to leave a median lobe in the bladder.

DR. GUSTAV KOLISCHER, Chicago: I think the beautiful pictures which Dr. Dakin has demonstrated furnish some argument against the method employed. The most important and the most complicated step in a prostatectomy, the enucleation, cannot be shown in pictures. I maintain that any prostatectomy that cannot be demonstrated is not good surgery. Digging around in the dark is a surgical misdemeanor, and digging your finger in the mucosa is another surgical misdemeanor. The surgical procedures employed in every other part of the body should be employed in bladder surgery. The two most important things are to find the line of cleavage under the guidance of the eye and deal in a full and certain way with the hemorrhage. It is true that men who operate in this way will say they get good results; I admit that you cannot kill every man. But the one case that goes wrong proves the weakness of the method. You will hear the statement quite often, "The hemorrhage was fairly well

checked, and I am quite sure the patient will not bleed." That is not good surgery. Would you enucleate a myoma of the uterus, close up the abdomen without properly checking the bleeding and trust to the Lord that the patient would not bleed to death? Certainly not. Nor should you in the bladder. The gentlemen who pride themselves on small incisions do not do good surgery. The same thing applies in operating against time. If we do a prostatectomy we must not only guarantee that the patient will not die on the table but that the patient will be cured. You can go into sanitariums and you will find lots of men who have had a prostatectomy who have traumatic strictures or incontinence, or they have to urinate every five minutes, whereas before the operation they only had to urinate once in two hours. That prostatectomy can be done after good sound surgical principles can be easily demonstrated. That is not only a personal opinion of mine, but of my followers. Dr. Koll is going to demonstrate a prostatectomy to-morrow and you will see every step of the operation, and the hemorrhage will be securely checked. You must not forget that so many men die after prostatectomy under all kinds of scientific diagnoses, sepsis, shock, etc., when what really happened was that those patients oozed themselves to death into their bladder. They did not die because they were septic, but they became septic because they were constantly bleeding. I plead again for this, that if you do a prostatectomy, do it in the same way that you would want a surgeon to do it on you. Do not tear around in the dark, and do not leave it to good luck that there wont be any postoperative hemorrhage.

DR. WILLIAM E. LOWER, Cleveland: It has been my misfortune to differ with Dr. Kolischer in most things, but on this particular occasion I want to say that I very heartily approve of the principles that he has brought forward here. I think it is a very great mistake to try to enucleate the prostate through a very small opening. There is no objection to making the wound large enough to work comfortably in the bladder. A large wound will heal just as quickly as a small one, if it is aseptic. So why not make sufficient room, whether it is enucleating the prostate, removing the kidney, or any other operation, so you do not put too much pressure on the tissues. I think there is a principle involved, that the more you traumatize tissue the less the resistance of the patient. I think clean cut tissue without much manipulation and retraction has much greater resistance than tissue that has been traumatized, and you have less infection.

I was hoping Dr. Dakin would dwell more upon the pre-operative and post-operative care of these cases. Some years ago I had written on this subject and published it and also demonstrated the method of producing a shockless suprapubic operation. I believe in combination with local anæsthesia, which has been spoken of here, that you must protect your tissues by infiltrating them. To this, however, I should like to add that I see no objections and many advantages to using a little nitrous oxide. In the case demonstrated here I noticed the respirations were rather rapid. That is a sign of shock, either psychic shock, or else from the traumatism, the respirations were rapid. That means that person is in a condition of shock, either psychic or physiological. I think it is very important to limit that if it can be done. I do not think it is necessary to force the patient up on the second day. It is not good surgical practice. I think the patient should be turned from side to side, propped up in bed, and made comfortable from all outside influences as well as local, but he should not be forced to do these things, because it is not very comfortable to be made to sit up if you do not feel like it, or to be made to walk if you have to be supported.

I think that this subject is being threshed out and becoming pretty well standardized. I believe we no longer feel the same fear that we did before in prostatectomy, because from the pre-operative care we know just exactly the amount of resistance the patient has, and that is a very good guide as to what we may expect in the post-operative results. It is not enough to say that we can put a patient through the ordeal of an operation, and not have a good post-operative result. The patient must be relieved from what you are operating for, with the minimum of complications. To avoid suprapubic fistula and all that, is just as important as it is to put the patient on the table and get him off alive.

DR. J. L. BOOGHER, St. Louis: The operation of prostatectomy is well recognized to-day and is familiar by experience to all of us. Is there any operation or any method of choice that can be used in all cases of prostatectomy? Isn't it a fact that in the cases where you have the greatest success the pre-operative arrangements and the preliminary treatment have been necessary for you to produce your best results? Are there any of you who can state that any one method of anæsthesia is the best method? In the case of the very aged there is the question of the anæsthesia. There can be no doubt about that. There should be a reorganization of the digestive tract in order to avoid toxemic heart conditions before operation. In local anæsthesia after the method of

Schleich it takes quite an expert to anæsthetize the tissues correctly by local anæsthesia. It is almost a life study in itself. That very fine results have been achieved in this way is true, but that it takes very patient and long study to accomplish perfect results by local anæsthesia is no less true. But where general anæsthesia can be accomplished, why resort to the uncertain method of local anæsthesia. Results are not always achieved by the anæsthesia that is chosen, but they are, I believe, achieved by a thorough exposure of all the tissues, and I thoroughly agree with the gentlemen who have preceded me in stating that all tissues should be exposed to the eye as far as possible in all operations.

DR. DAKIN: Regarding spinal anæsthesia, I am very sorry to hear of the bad results the Doctor had. I haven't seen anything similar to that in the cases that I have had. As far as some of the criticisms of the operation are concerned, I realize that because of the reputation of the men who made them it is rather hard to contradict them, but all I can say is the cases have gotten along well and it is rather a bold statement to make that in not one of these cases has there been a bad hemorrhage; not even in the carcinoma cases. As far as speed is concerned, I took my own time. I had good anæsthesia, and I wasn't trying to beat someone's record. I took my own time and did a slow enucleation. All I can say is that the patients got along well and have recovered well, and the results are very good with the method I have followed, and I cannot see why we should take so much longer to do the open operation. There are men who do get a lot of bleeding. I do not know why, whether it is because they are rough in the enucleation or what is the reason. As far as nitrous oxide is concerned, I would have been glad to get nitrous oxide. This was a charity institution, and they could not afford it. As far as the cases walking for demonstration, that is a wrong idea. I did not do it for that reason; the reason was because they would get along better and their strength would permit it. The reason you saw a man or two walking along with these patients, is, that if you stay in bed a week or two and then try to walk you are apt to have a little syncope. I did not want to take any chances of fractured skulls. They were not made to walk for demonstration. Every one of these cases except emergency cases are made to walk and keep walking every day up to the day of operation.

DR. EISENSTAEDT: I have nothing to add. I merely want to emphasize the fact that we have developed a test for the

efficacy of perineal flooding of the peri-prostatic plexus. The tugging on the prostate with a volsellum or the stretching of the posterior urethra serves as a very good indication whether or not we have achieved the looked-for complete anæsthesia, and when not obtained by the perineal method, we can readily produce it by injection from within the bladder. I would also like to emphasize the herring-bone arrangement of the infiltration of the soft parts overlying the bladder, and that the infiltration is carried along the attachment of the peritoneal fold to the bladder wall.

SOME NEW METHODS IN THE TREATMENT OF CARCINOMA OF THE LOWER GENITO-URINARY TRACT WITH RADIUM.

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During the past two years we have treated with radium sixty-six cases of cancer of the prostate. In forty-two of these the tumor was extensive, not only the prostate but the seminal vesicles being involved. In nineteen the process was confined apparently to one half of the prostate and the corresponding vesicle, while in four the vesicles were apparently free from invasion.

The diagnosis of carcinoma was made by rectal examination alone in all but four cases. These had previously been operated upon, the tissue removed showing typical carcinoma. The diagnosis of malignancy was confirmed in twelve other cases, nine of which were subsequently operated upon and three coming to autopsy. In the remaining cases in which histological confirmation was impossible, the findings were typical of malignancy.

Technique of Treatment. The treatment in practically all of these cases has been carried out with 103.7 milligrams of radium element, contained in a thin glass tube 24.3 millimeters in length and 3.4 millimeters in diameter. In the treatment of all the cases of prostatic carcinoma, the glass tube of radium has been contained in a capsule of platinum, 29.5 millimeters in length, 6.5 millimeters in diameter,

and 1.5 millimeters in thickness, a screenage more than sufficient to filter out practically all of the irritating beta rays. In the treatment of carcinoma of the prostate and seminal vesicles, three portals of application are available: the urethra, bladder, and the rectum. The platinum capsule with its contained radium is introduced in the beak of a metal instrument, in general outline not unlike the cystoscope.[1] (Fig. 1.)

Urethra and Bladder. The patient lies upon his back on a flat operating table and after the genitalia have been cleansed in a manner similar to that for cystoscopy, the instrument carrying the radium in its beak is introduced and held at the desired point by means of a mechanical arm attached to the table. (See Fig. 2.) The prostatic urethra may be so treated that successive treatments do not overlap, the anterior half being treated at one time, the half nearest the bladder at another. The urethra, because of its anatomical relations to the tumor, forms an admirable point of attack and in cases with evident involvement of the lateral and median lobes, a large portion of the treatment is carried out from this site. The seminal vesicles and intervesicular region may be conveniently radiated through the bladder, the capsule being carried just within the internal sphincter and rotated to the right or left or allowed to remain in the mid-line. In some of our cases as much as five hours of radiation have been given during one séance, the position of the radium being changed at hourly intervals. We have made it a rule to chart as accurately as possible the exact position of a given radiation, as shown in the accompanying diagram (Fig. 3), a straight line indicating the region radiated,

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[1] These instruments have previously been described in the *Journal of the American Medical Association*, April 21, 1917, by H. H. Y.

opposite which is placed the date and the amount of treatment, reckoned in milligram-hours. By this means the treatment in a given case is graphically shown and too frequent repetition of radiation at one point may be avoided. The resistance of the bladder and urethra, so far as irritation is concerned, is subject to considerable individual variation, but as a rule from twelve to fifteen hundred milligram-hours may be given in the course of the month, providing radiation at any one point does not exceed 100 milligram-hours during one treatment, and if the intervals between treatments are of sufficient length.

Rectal Radiation. For these treatments the patient lies upon his side, with the knees and thighs sharply flexed. The radium is introduced into the rectum in the beak of the instrument used for urethral applications and accurately placed over the part to be radiated, being held in position by the gloved finger until grasped by the mechanical arm. (See Fig. 4.) It has been our plan before beginning treatment to chart as accurately as possible the outlines of the carcinoma. It is then possible, as shown in the accompanying diagrams (Fig. 5), to so plan the treatments as to avoid overlapping, thus decreasing the danger of rectal irritation. As many as fifteen to twenty areas may be thus mapped out and the entire tumor systematically treated. It is well in consecutive treatments to select areas quite widely separated, as for instance the seminal vesicles, or the apex of one lobe and the base of the other, thus reducing the danger of injury to the mucosa. The normal rectal mucosa is so freely movable over the underlying structures that the treatment of adjacent areas in rapid succession cannot be carried out without considerable risk.

In the trans-rectal treatments we usually endeavor to give from 1,500 to 2,000 mg.-hrs. in the course of

six weeks to two months, using the same precautions outlined above for the urethra. Usually at the end of this time, there are beginning signs of rectal irritation and the treatment is immediately discontinued, to be resumed some time after the last symptoms have disappeared, which is usually in the course of one to two months. The rectal irritation produced by radium is manifested by frequent desire to stool, burning discomfort, and the discharge of mucus, which may be blood-tinged in the more aggravated cases. Rectal examination at this time may reveal considerable swelling of the mucous membrane or nothing abnormal may be made out. In certain cases having rather marked subjective symptoms, the mucous membrane may be normal to palpation, while in others, experiencing no discomfort whatsoever, the mucosa shows marked thickening. In one of our cases palpation revealed, in addition to marked thickening, definite crepitation as if there were air beneath the mucosa.

Great variation in the resistance of the mucous membrane has been noted. On the one hand, it may become quite marked after six to eight hundred mg.-hrs. have been given, while in other cases from 1,500 to 2,000 mg.-hrs., given in proportionately the same time, are followed by little or no discomfort. The cause of this great variation in resistance is not always apparent but in our experience, carcinomatous involvement of the rectal wall or pressure upon the rectum resulting from marked enlargement of the prostate, suggests that interference with the blood supply and consequent diminution of regenerative power may furnish an explanation. These are cases showing as a rule to palpation very little evidence of irritation. The rectal mucosa shows no thickening or ulceration, the chief symptoms being burning discomfort, frequent desire to stool, and in some cases

the occasional discharge of small amounts of mucus. The appearance of these symptoms, even though there be no palpatory evidence of irritation, calls for an immediate suspension of rectal treatment, the remaining course being carried out through the urethra and bladder.

Upon cessation of the treatment per rectum, slight symptoms of irritation usually subside in the course of a few weeks. From our experience it would not seem advisable to resume the treatment per rectum until two or, possibly better, three months after the last symptoms or other evidence of irritation through palpation have disappeared. Under the head of delayed reaction, may be grouped certain cases having only slight temporary irritation after the first series of treatments. Upon continuing the treatment after too short an interval, marked rectal irritation resulted, the appearance of severe irritation being long delayed, in some instances several months after the last treatment. In the majority of cases, from 1,500 to 2,000 mg.-hrs. of radium may be given during the course of six weeks to two months without producing marked irritation.

External Radium Treatments. Our study of these cases would be incomplete were we not to mention the external applications of large amounts of radium to the lower abdomen, perineum, and sacrum. These treatments were carried out by Dr. C. F. Burnam. In three cases the treatment was purely external, no urethral or rectal applications being made, and these have not been included in this series. In twelve other cases both methods were employed. The radiations were made with from 1,500 to 2,500 mgs., the duration of the treatment ranging from eight to fifteen hours, and the distance from the skin averaging three inches. The three cases receiving external radiation alone showed no improvement. In the

remaining twelve the improvement was marked in two cases. One of these was treated through the perineum with 2,000 mgs. for nine hours at a distance of three inches. Subsequently he received 2,600 mg.-hrs. through the urethra and rectum. The consistence of the prostate was greatly reduced and the symptoms, which before treatment were greatly aggravated, cleared up completely. This patient remains symptomatically well to-day, one year after the treatment. The second case received two external applications and 900 mg.-hrs. through the urethra. He was seen recently, eighteen months after the last treatment, with marked symptomatic improvement and a prostate somewhat enlarged but not suggestive of malignancy.

The chief difficulty in external treatments is the great distance of the radium from the lesion to be radiated. The distance is frequently from fifteen to twenty-five centimeters, while in the internal treatments, particularly the urethral and rectal, it is possible to place the radium almost directly against the neoplasm, in fact separated only by tissues from one to three millimeters thick (the urethral mucosa and the rectal wall). As the potency of the radium varies inversely as the square of the distance from the part to be radiated, the importance of reducing the distance can be appreciated.

Study of Results. The results from radium treatment of carcinoma of the prostate and seminal vesicles have in many cases been most encouraging. Cases presenting marked urinary obstruction have responded in the course of six weeks to two months, and in some instances a large residual urine has diminished to zero. Cases giving a history of voiding from ten to twelve times at night and then only with extreme difficulty and pain, have shown, after a course of treatment, marvellous improvement, urination

being accomplished in a normal manner. In our series of sixty-six cases nineteen received less than 1,200 milligram-hours, while the remaining forty-seven were given more than this amount, the radiation in many cases ranging from three to five thousand milligram-hours. We have analyzed our results as follows:

Cases with Complete Retention. In eleven retention of urine was complete. In two cases the treatment was less than 1,200 milligram-hours, while in the remainder it averaged about 3,000 milligram-hours. The obstruction in these cases, with one exception, showed no improvement, eight of them subsequently coming to operation for the relief of urinary retention. The single case was only partially benefited and has had to resort to catheter at night since.

Frequency and Pain. Fifty-one cases gave a history of more or less frequency and dysuria. In seventeen the radiation was less than 1,200 milligram-hours and the improvement symptomatically very slight. In the remaining cases, receiving adequate treatment, the improvement in many was very striking, nine being almost completely relieved of obstructive symptoms, nine showing marked improvement, nine responding only slightly, seven being unchanged.

Size and Consistence. Those cases which have responded symptomatically have shown also, as a rule, improvement in the size and consistence of the prostate and seminal vesicles. In many instances the prostate has changed from a stony consistence to the normal elasticity. The size has also diminished, although in this respect the change has not been so striking. In many of these cases, examination now would lead to a diagnosis of adenomatous hypertrophy. The change in the size and consistence of the seminal vesicles has not been at all comparable to the improvement noted in the prostate.

In the forty-two cases having extensive involvement, thirty received treatment exceeding 1,200 milligram-hours. In eleven of these cases, all of which received from 2,000 to 5,000 milligram-hours, there was a marked change in the consistence, while in three the prostate showed considerable diminution in size and in four there were very definite changes in the size and consistence of the seminal vesicles.

Of the nineteen cases showing a unilateral involvement (prostate and one vesicle), fourteen received radiation exceeding 1,200 milligram-hours. Of those receiving from 2,000 to 4,000 milligram-hours, eight showed marked softening of the prostate and in two there were corresponding changes in the vesicle.

In four of the cases the involvement was confined apparently to the prostate. In three of the cases the radium treatment was short and not completed and no conclusions can be drawn. In the fourth case, the carcinomatous area was small and confined to one lobe. Eighteen hundred milligram-hours were given per rectum and 225 milligram-hours per urethra during the course of ten months. At first there was apparent improvement in the consistence of the area but notwithstanding treatment it later assumed active growth and was completely removed by subtotal prostatectomy. No explanation for the unusual resistance in this case is apparent.

Of nineteen cases in which there was marked change in the consistence of the prostate, eight showed a striking improvement in urinary symptoms, four a moderate improvement, four slight improvement, and three no improvement.

In five cases of the series the carcinoma was most resistant to treatment, there being very little change either in the size and consistence of the prostate and seminal vesicles, and slight if any improvement in symptoms. One of these cases received radiation

exceeding 2,500 milligram-hours, two exceeding 3,200, and two exceeding 5,000.

In four cases a prostatectomy had been performed previous to the application of radium. The tissues removed at operation showed definite carcinoma. In two of these cases the treatment is too recent to draw any conclusions. In the third case a suprapubic prostatectomy was performed in January, 1915, in another city. From April 26, 1915, to May 12, 1915, nine radium treatments were given elsewhere through the rectum, the total radiation being 1,800 milligram-hours. When seen by us in June, 1915, rectal examination revealed a prostate slightly smaller than normal, quite irregular, moderately indurated but not suggesting malignancy. The microscopic sections of the tissue removed at operation were examined by us and showed typical carcinoma. On cystoscopy the trigone appeared thickened, very irregular, and lobulated. On rectal examination, with the cystoscope in the urethra, the tissues in the trigonal region, although markedly thickened, were extremely soft. Radium applications to the trigone were immediately begun, June 10, 1915, and in the course of a few days 150 milligram-hours were given. In addition an application of 1,700 milligrams was given to the perineum and abdomen for a period of eleven hours. During the following month 160 milligram-hours were given to the trigone and posterior urethra, and 1,600 milligrams were applied for four hours to the abdomen and five hours to the perineum. In October, 1915, the perineum was again radiated with 1,900 milligrams for seven and a half hours. No treatment has been given since March, 1916, when he received 350 milligram-hours to the trigone and urethra and 200 milligram-hours through the rectum to the trigone. At the last cystoscopy ten months ago (June 10, 1916) the trigone was still considerably enlarged but the mucous membrane

was smooth and there was nothing to suggest malignant invasion. Rectal examination was not suggestive of malignancy. This patient is free from symptoms at present (April 24, 1917).

In fourteen cases of the series with evident metastasis there was pain in the back, hips, or thighs. In none of these cases, of course, was there any alleviation of this symptom following radiation of the primary growth. During the past six months we have had two cases complaining of marked pain in the hip and thigh which have been afforded considerable relief by intensive treatment with the *x*-ray, which was directed against the region involved in the spine or along the sciatic nerve, particularly in the region of the sacrosciatic notch. By using small portals side by side many exposures, all reaching the deep area involved, but each through a different skin area can be safely made. In a few cases with very severe pains in hip and thigh, marked improvement was thus obtained. The Coolidge tube was used, operating at a spark gap of nine and a half inches and a current of 20 milli-amperes. A screen of 2½ millimeters of aluminum and 4 millimeters of glass was employed. The usual distance from focus to skin was eight inches and the time of exposure two and three-quarter minutes. The focal distance in all exposures was carefully measured and in the event of its being greater or less than eight inches, the time was either increased or diminished, the time of exposure, other things being equal, being proportionate to the square of the distance of focus to skin. More or less recently we have been raying the abdomen, back, and perineum in conjunction with the use of radium. We have endeavored in these cases to secure as many portals of entry as possible, the areas being plotted in two-inch squares with a ten per cent solution of silver nitrate which leaves a more or less permanent record. The

radiation of a given area should usually not be repeated within a month's time. By following this plan we have seen no erythema following the treatment.

Cases showing Symptomatic Improvement. The following cases are cited as illustrative not only of marked symptomatic improvement but also of reduction in size and consistence of the prostate and seminal vesicles:

No. 5,446, aged 80. Was admitted October 12, 1916, complaining of frequent and difficult urination. For two years prior to his coming to the hospital he had had increasing frequency and for six months urination was accomplished with great difficulty and pain. Rectal examination on admission revealed a very definite carcinoma involving the entire prostate and left seminal vesicle. On cystoscopy 325 cubic centimeters of residual urine were recovered. Study of the prostatic orifice showed some median enlargement and considerable trabeculation of the bladder wall. From October 12, 1916, to December 16, 1916, 500 milligram-hours of radium were given per urethra and 1,500 per rectum. Examination at the end of this series of treatments showed marked improvement in the induration, although the condition was still suggestive of carcinoma. Treatment was resumed January 8, 1917, and during the next three weeks 500 milligram-hours were given per urethra and 200 per rectum. At the present time (April 25, 1917) urination is accomplished with ease and the patient voids at normal intervals. There is no residual urine. Rectal examination reveals a prostate of normal size, smooth and slightly indurated. Both seminal vesicles are slightly thickened and adherent. The case now presents a picture of slight prostatitis and seminal vesiculitis.

No. 5,193, aged 62. Admitted June 11, 1916, with a history of urinary frequency beginning three years

before. These symptoms gradually became more marked and for the past year he has been required to pass his urine at hourly intervals during the day and from two to four times at night. Throughout the course of the illness there had been considerable hesitancy and dribbling, and during the year before admission urination had been accomplished only after considerable straining.

Rectal examination showed that the prostate and seminal vesicles were involved in a very definite carcinoma. The prostate, although not much larger than normal, was very irregular, fixed, and markedly indurated, particularly the left lobe. The induration was continuous with a mass in the region of both seminal vesicles, both of which were enlarged, nodular, fixed, and very hard.

The patient received two courses of treatments, the first being carried out between June 12, 1916, and July 20, 1916, during which time 1,400 milligram-hours of radium were given per rectum and 400 milligram-hours per urethra. At the end of this series, the prostate and seminal vesicles showed very little change and the symptoms only slight improvement. The treatment was resumed in September, 1916, and from September 16 to October 14, 1916, 1,000 milligram-hours were given per rectum and 300 per urethra. At this time the patient complained of slight rectal irritation, examination showing a somewhat thickened rectal mucosa. The prostate was of normal size and everywhere elastic. Both seminal vesicles, although moderately prominent, were only slightly indurated. Rectal examination of the prostate and seminal vesicles, if made now for the first time, would suggest the diagnosis of prostatitis and seminal vesiculitis, and not cancer. It has now been ten months since the beginning of this treatment. Since the last treatment in October, 1916, there has

been gradual improvement. Urination is now (March, 1917) accomplished with ease, the patient holding his urine for three hours during the day and voiding twice at night.

No. 4,726, aged 73. Admitted November 18, 1915, with a history of slight urinary frequency beginning one year previously. Shortly after the onset, urination became quite difficult. These symptoms gradually increased and for several months before admission the patient had been voiding every few minutes day and night. Finally complete retention requiring catheterization came on.

Rectal examination showed the prostate somewhat enlarged, its surface irregular, and both lobes markedly indurated, the consistence of the left lobe being stony and undoubtedly cancerous. Both seminal vesicles were enlarged and indurated, the left apparently malignant, the right inflammatory. Cystoscopy: Residual urine 100 cubic centimeters. Bladder capacity 150 cubic centimeters. Both lateral lobes only slightly enlarged intravesically; moderate trabeculation of bladder wall and hypertrophy of trigone. Nothing suggesting carcinomatous invasion of bladder.

During the first month of treatment, the patient received 500 milligram hours per urethra and bladder and one external radiation of 2,000 milligrams to the perineum — time nine hours, distance three inches. Treatment was resumed nine weeks later and during the next seven weeks 950 milligram-hours were given per rectum and 825 per urethra. Frequent rectal examinations have shown gradual improvement in the condition and at the last examination on April 6, 1916, the prostate was not enlarged. The right lobe was somewhat irregular but perfectly elastic, while the left was smooth and still considerably indurated, but much less so than on admission. There has been no urinary difficulty since the treatment

Fig. 1.
Instrument for rectal and urethral applications.

Fig. 2.
Illustration showing the method of giving urethral and bladder radiations. The mechanical arm attached to table holds instrument in desired position.

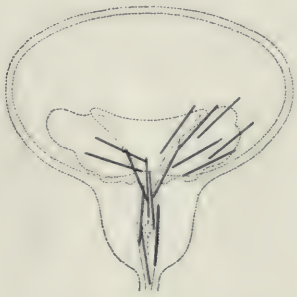

Fig. 3.
Chart showing the transvesical and transurethral treatments.

Fig. 4.
Showing method of giving rectal radiations.

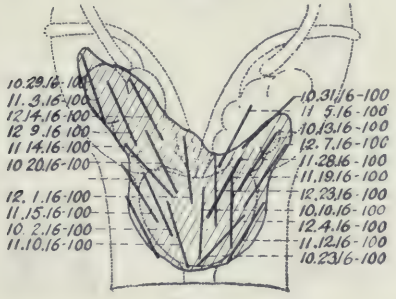

Fig. 5.

A case of carcinoma of the prostate and left seminal vesicle (right vesicle slightly involved). The radium treatments are here represented with dates, each line indicating 100 milligram hours of treatment.

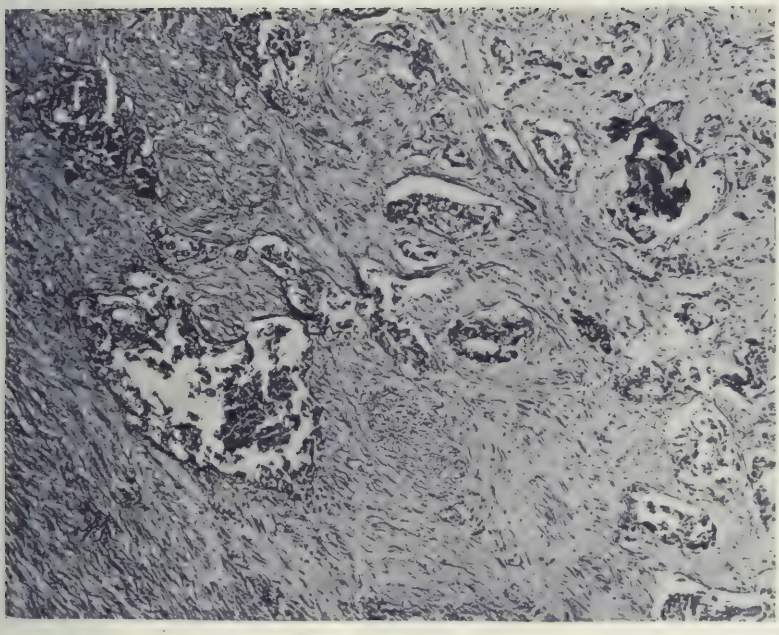

Fig. 6.

Low power view of section of prostate (Case 1) showing degenerative changes.

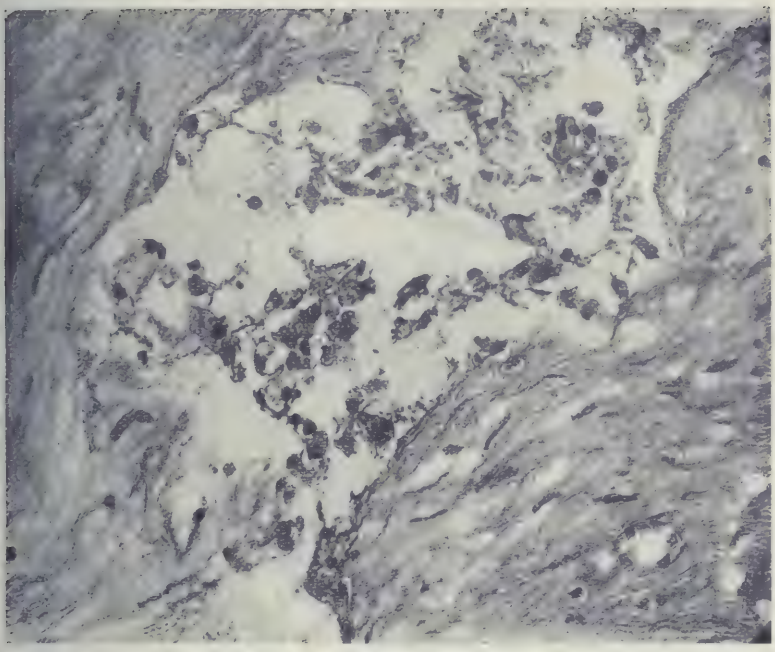

Fig. 7.

High power view of section of prostate (Case 1) showing extensive destruction of cancer area.

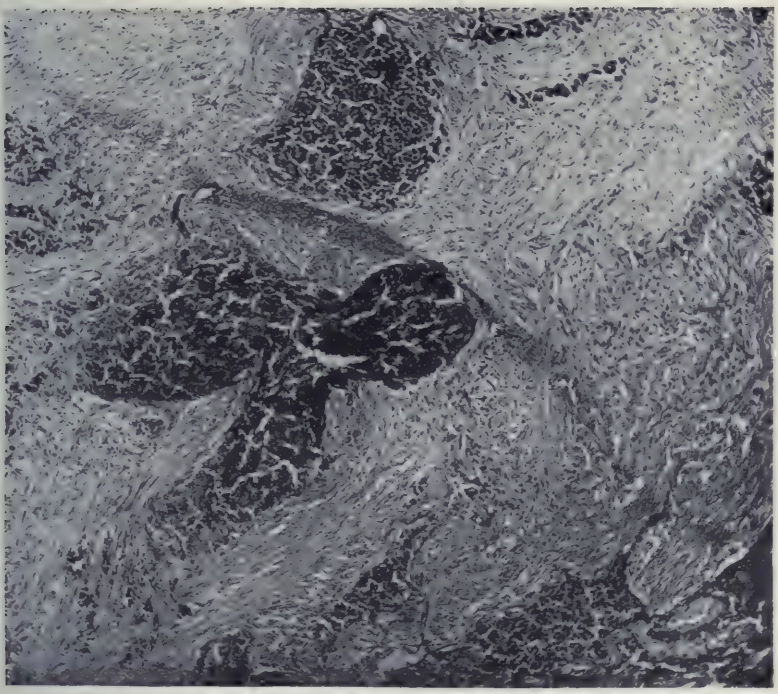

Fig. 8.
Low power view of Case 2 showing peculiar nuclear changes.

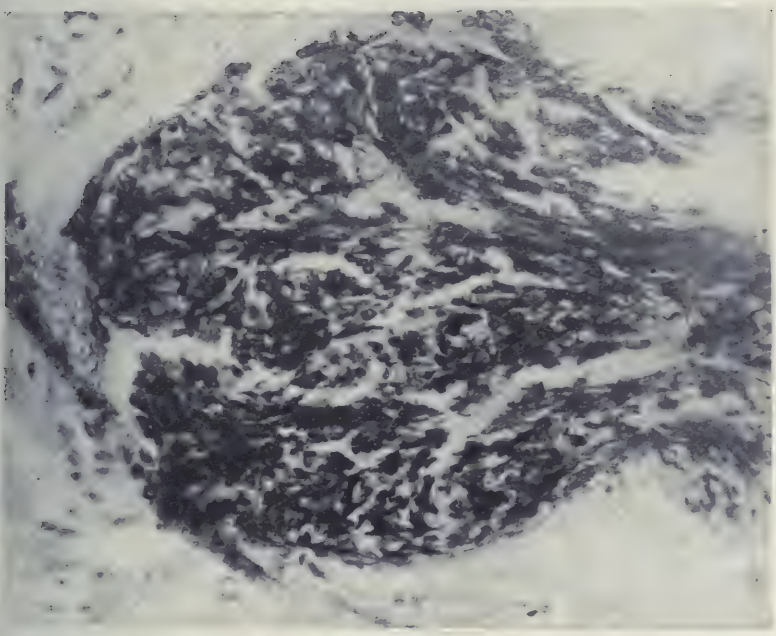

Fig. 9.
High power view of area shown in Fig. 8.

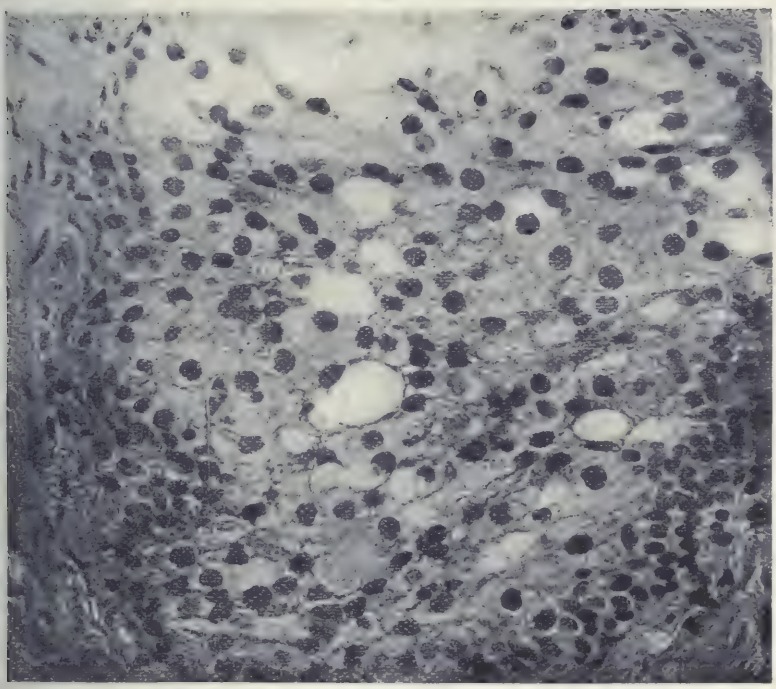

Fig. 10.

High power view of section from Case 4, showing one of the small areas of carcinoma apparently unaffected by the treatment.

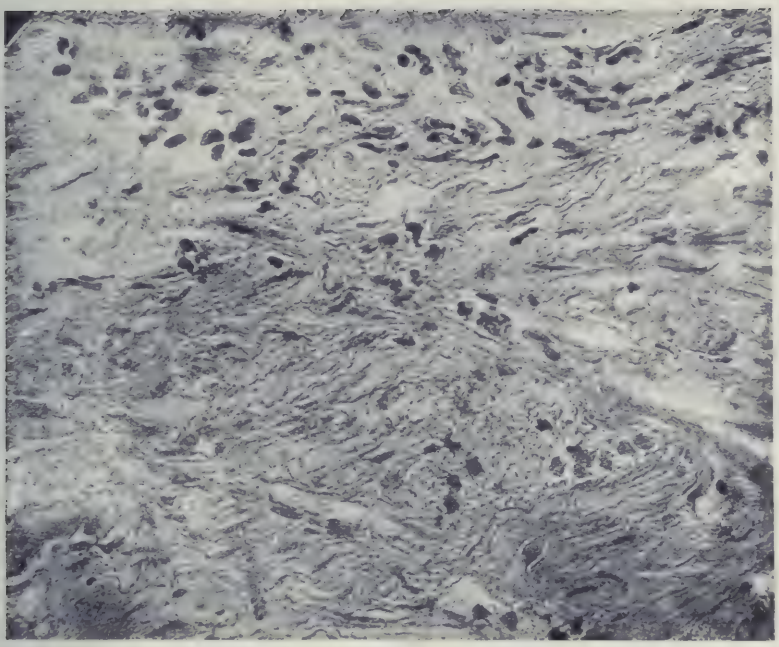

Fig. 11.

High power view of section of Case 4 showing the marked degenerative changes seen through most of the tumor.

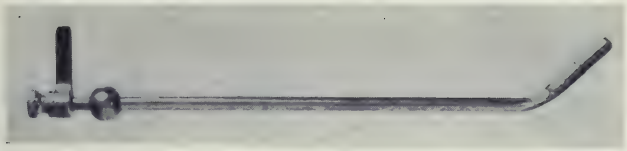

Fig. 12.

Instrument used for tumors in the region of the vesical orifice and trigone.

Fig. 13.

The same as Fig. 12 with the observation cystoscope in position.

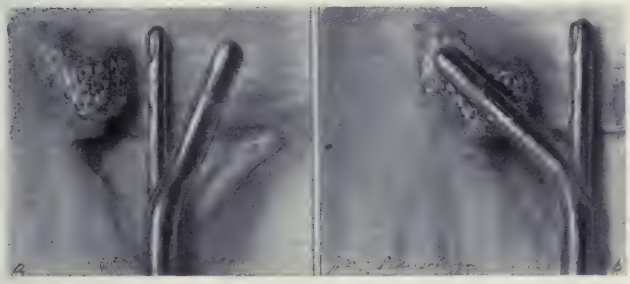

Fig. 14.

Showing the application of radium to a tumor in the region of the right ureteral orifice.

Fig. 15.

Instrument for the treatment of lateral wall tumors.

Fig. 16.

The instrument shown in Fig. 15 with the blades open and observation cystoscope in position.

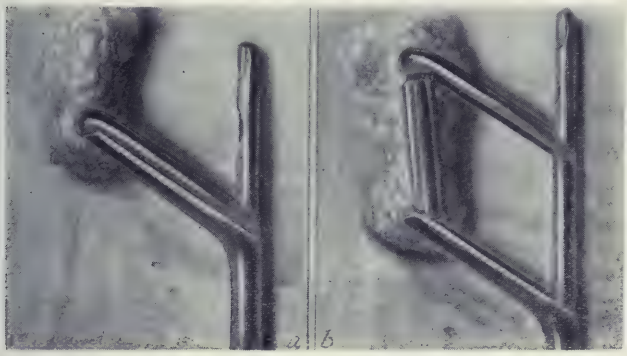

Fig. 17.

Showing applications of radium to the tumor.

Fig. 18.

Instrument for the treatment of anterior and posterior wall tumors.

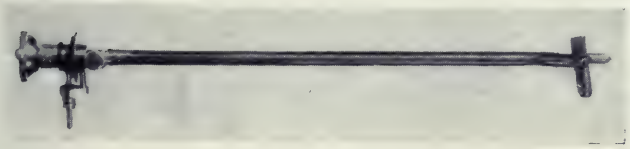

Fig. 19.

The instrument shown in Fig. 18 with the beak turned ready for the application to the tumor.

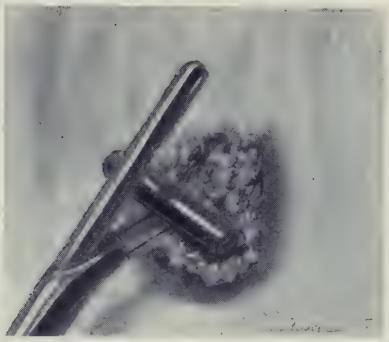

Fig. 20.
Application of radium to the tumor.

Fig. 21.
Sagittal section of bladder showing the application of radium to a tumor on the posterior wall.

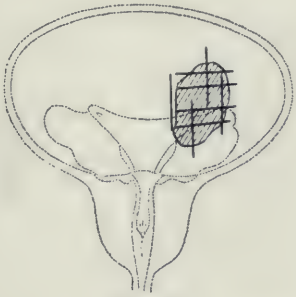

Fig. 22.
Chart showing tumor in region of left ureteral orifice, the straight lines each indicating 100 milligram-hours radiation.

one year ago (letter, Feb. 1917) and the patient is practically free from symptoms. Urination is perfectly normal and he is able to hold his urine for five hours.

The Histological Changes Produced by Radium. In twelve of the cases of carcinoma of the prostate and seminal vesicles, which had been subjected to more or less extensive radiation through the urethra and rectum, we secured tissue for histological examination. Of these cases nine were operated upon for the relief of urinary obstruction, eight having perineal prostatectomy performed, one the punch operation. In the remaining three, tissue was procured at autopsy. Brief histories of these cases with clinical findings and treatment, together with gross and microscopic description of the tissue removed, follow:

Case I. No. 4,766, aged 59. Admitted Dec. 11, 1916, with a rather marked onset of urinary frequency eight months before. For several months the patient had been voiding every half hour at night and at fifteen-minute intervals during the day. Urination was accomplished only after marked straining, the urine being voided drop by drop. Several weeks before admission he developed complete retention, requiring catheterization. Examination on admission revealed an extensive carcinoma involving the entire prostate and seminal vesicles. On cystoscopy the lateral and median lobes showed slight hypertrophy intravesically. The trigone was very œdematous, irregular, and elevated. There was no evidence of neoplastic growth within the bladder, yet the trigone gave the examiner the impression that it was infiltrated.

Treatment. Shortly after admission one external application of radium was made, 1,886 mgm. being applied to the perineum for eight hours at a distance of three inches. During the next five months the

patient received applications of radium to the prostatic urethra and bladder and per rectum, 100 mgs. of radium with a screenage of 1½ mm. platinum being employed. Twenty-four treatments totalling 2,900 mg.-hrs. (1,100 mg.-hrs. per rectum and 1,800 mg.-hrs. per urethra and vesica) were given. At the end of these treatments the symptoms, so far as urination was concerned, had not improved. Examination of the prostate, however, showed considerable improvement in the consistence, the gland being quite elastic. Slight changes in seminal vesicles. On May 20, 1916, a perineal prostatectomy was performed for the relief of urinary obstruction. The tissue removed at operation was of cartilaginous consistence, differing from the average carcinoma in the absence of the characteristic yellow color so frequently seen in malignant disease of the prostate.

Microscopic. The tissue shows a large number of carcinomatous acini which are in various stages of degeneration. For the most part the arrangement is that of adenocarcinoma, although in some areas the acinus is completely filled with cells. Most of the cells are broken away from the basement membrane, much shrunken and barely take the stain. All are very granular, a number being composed entirely of coarse granules surrounding the nucleus without any visible cell membrane. The nuclei which are of varying size are very pyknotic. In some areas the degeneration is complete, the outlines of the acinus being denuded of cells and filled with granular debris in which an occasional pyknotic nucleus is seen. (See Figs. 6 and 7.)

Following the closure of the perineal wound, rectal examination showed considerable induration in the region of the prostate with enlarged and indurated seminal vesicles. From August 9 to October 12, 2,200 mg.-hrs. of radium were given per rectum.

At the end of these treatments rectal examination revealed slight induration in the region of the prostate and seminal vesicles but nothing suggestive of malignancy.

Case II. No. 4,231, aged 66. Admitted March 2, 1915, with a history of occasional attacks of acute retention requiring catheterization throughout a period of eighteen months. There was rather marked frequency and difficulty in voiding. Rectal examination, on admission, revealed an extensive carcinoma involving the entire prostate and both seminal vesicles.

Treatment. The radium treatment in this case has been carried out by external application of large amounts and the intraurethral and intrarectal use of 103 mgm. The following external treatments were given:

4/28/15—	1200	mgs.	to perineum for 11 hours.
5/11/15—	1700	"	" suprapubic region for 6 hours.
6/10/15—	1700	"	" perineum for 5 hours and
	1700	"	" suprapubic region for 4 hours.
7/ 8/15—	1700	"	" suprapubic region for 8 hours.
10/ 7/15—	2000	"	" suprapubic region for 5 hours and
	2000	"	" perineum for 5 hours and
	2000	"	" sacrum for 5 hours.

At the end of these treatments the patient showed very little change symptomatically and the prostate and seminal vesicles on rectal examination revealed practically the same condition as on admission. From this time until November, 1916, the treatments were carried out per urethra and per rectum, a total of 3,250 mg.-hrs. being given (2,500 per rectum and 750 per urethra). Examination now showed very little change in the size and consistence of the seminal vesicles. The patient's condition grew gradually worse and he developed complete retention of urine for which a perineal prostatectomy was performed on November 17, 1916.

Gross Appearance. The tissue removed did not resemble carcinoma as it is usually seen. Much of it was quite soft, while other areas were fibrous and made up of interlacing trabeculæ in the interstices of which were small yellow areas. The tissue was quite firm but not of stony consistence.

Microscopic. The sections of this tissue show adenocarcinoma which in many places has extensively invaded the stroma. In many areas which are apparently carcinoma the acini are filled up with masses of material which take the hæmatoxylin stain and are composed of dense strands packed closely together. Whether this represents a peculiar type of nuclear degeneration or what appears more probable from a study of certain areas, a fibroblastic proliferation, is difficult to determine. Among the strands may be seen epithelial nuclei. The epithelium for the most part shows marked degeneration, although in certain areas it is fairly well preserved. In the acini containing none of the blue staining strands the cells are granular and take only a very slight hæmatoxylin stain. They are almost completely filled with oval nuclei in which the arrangement of chromatin is well made out. Throughout most of the section, however, the epithelium presents an appearance of more advanced degeneration; the cells are completely broken up but in some places pyknotic nuclei remain. (See Figs. 8 and 9.)

Five weeks after the operation the patient left the hospital with the operative wound completely healed. He was able to retain urine for four to five hours and there was apparently an excellent functional result. Two months after returning home, however, there was a rapid extension of the carcinoma, the patient dying March 15, 1917.

Case III. No. 4,718, aged 61. Admitted November 15, 1915. This patient was admitted to the hospital

with renal colic and during the routine examination a small markedly indurated area was found in the right prostatic lobe near the apex. He had never had any symptoms of urinary obstruction or symptoms suggestive of prostatic trouble. After the passage of the ureteral calculus, radium treatment was begun, 103 mgs. of radium with 1½ mm. platinum screen being given directly over the small area which apparently did not exceed 1½ cm. in diameter. From February to November, 1916, eighteen treatments totaling 1,800 mg.-hrs. were given per rectum directly over the indurated area in the right lobe. Frequent rectal examinations showed a slight but definite increase in the size of the tumor, notwithstanding the treatment, and on February 9, 1917, a subtotal prostatectomy was performed, the carcinoma apparently being completely removed.

Gross Appearance. Examination of the tissue removed showed a more or less localized carcinoma confined for the most part to the posterior capsule in the region of the apex. Little if any change as a result of radium could be determined from the gross appearance.

Microscopic. The sections apparently show no effect of radium treatment; the cells and nuclei are all well preserved and present nothing unusual. The tumor is very cellular, there being but a small amount of stroma present.

The patient was discharged from the hospital at the end of six weeks with the perineal wound healed. Urination was free and the patient was able to retain urine for five hours. Three months after operation a perineal abscess developed resulting in the formation of a recto-urethral fistula. Examination at the present time (May 15, 1917) reveals nothing to suggest recurrence.

Case IV. No. 5,523, aged 65. Admitted November 9, 1916. The onset of urinary symptoms eight months prior to admission began with frequency and difficulty in voiding. These symptoms gradually became more marked until the patient developed a paradoxical incontinence. Rectal examination showed a somewhat irregular and very hard prostate. It was very fixed and the examining finger could not be passed between the lateral lobes in the mid-line, as is usual in hypertrophy. The prostatic induration is continuous with a similar consistence in the region of both seminal vesicles, both of which are very much enlarged, irregular, and adherent. During the next six weeks 900 mg.-hrs. of radium were given per rectum and 400 mg.-hrs. per urethra. The complete retention being unrelieved, a perineal prostatectomy was performed December 17, 1916.

Gross Appearance. The gross picture is rather characteristic of carcinoma except that it seems to contain more fibrous tissue and fewer yellow areas, although several definite yellow areas are to be seen. Instead of being incompressible, as is the average carcinoma, the tissue is quite elastic, a feature noted in other cases receiving radium treatments prior to operation.

Microscopic. These sections show a great excess of fibrous tissue in the meshes of which are acini which have undergone all stages of degeneration. The cells are pale-staining, coarsely granular, and most of the nuclei completely pyknotic. The cell membranes have for the most part disappeared. The architecture of most of the acini is destroyed, no lumen being present, the cells being compressed by the dense fibrous tissue. It is impossible, therefore, to distinguish accurately between acini and true invasion. In several small areas of the section tubules filled with well-preserved epithelial cells

are seen. The cells are swollen, clear, and contain active looking nuclei (a type of cell frequently seen when carcinoma is growing actively in a tubule). In one of these tubules several pseudo-acini can be seen, the cells being grouped about central lumina but without separating trabeculæ. Except for these areas just noted, the tumor would appear to have undergone very marked regressive change. (See Figs. 10 and 11.)

The operation was followed by closure of the perineal wound on the 23d day. At the time of his discharge from the hospital on February 3, 1917, he was holding his urine for three hours during the day and voiding once at night. Urination was accomplished without straining and there was perfect control. Rectal examination at this time revealed nothing suspicious of malignancy.

Case V. No. 5,626, aged 58. Admitted December 30, 1916, with a history of obstructive symptoms beginning six months before. Frequency of urination and dysuria have gradually increased. Rectal examination on admission revealed a prostate somewhat enlarged, irregular, but elastic for the most part. Along the base of both lobes and the lateral margin of the left is rather marked induration which is continuous with an enlarged and hard left seminal vesicle. The condition was considered to be very suspicious of carcinoma and in the course of three weeks 800 mg.-hrs. were given per rectum and 300 per urethra. At the end of this period the urinary retention was unrelieved and a perineal prostatectomy was performed.

Microscopic. A very cellular type of adenocarcinoma. The acini are small and in most of the sections tightly wedged together, there being a very small amount of intervening stroma. In some of the sections the acini are so closely packed that the

lumen is obliterated. The cells and nuclei show no apparent change due to radium.

The functional result in this case is excellent. The wound closed on the seventh day and at the time of his discharge from the hospital he was able to hold urine for four hours, voiding it freely and in good stream. Rectal examination revealed nothing to suggest malignancy.

Case VI. No. 4,259, aged 65. Admitted March 17, 1915. This is a case of extensive carcinoma of the prostate and seminal vesicles. He was operated on March 24, 1915, for relief of urinary obstruction. He returned to the hospital October 4, 1916, with complete retention of urine. Examination revealed a marked extension of the carcinoma with infiltration of the prostatic orifice and trigone. Radium treatment was immediately begun, and from October 5, 1916, to December 9, 1916, 2,400 mg.-hrs. were given per rectum and 250 per urethra. At the end of this time there was no improvement in obstruction. On December 13, 1916, through a perineal incision a large mass of carcinoma was removed from around the prostatic urethra and beneath the vesical orifice.

Microscopic. This tumor is apparently a very actively growing carcinoma. In some areas the arrangement is that of adeno-carcinoma; in others it has extensively invaded the stroma and conforms to no general type of architecture. The cells, in many areas, are well preserved; in others broken up. The nuclei in the adeno-carcinomatous parts for the most part are large, pale-staining, and contain one or two nucleoli. The invasive growth shows marked pyknosis and some shrinkage of the cells away from the surrounding stroma. Apparently there has been no marked change as a result of radiation.

Case VII. No. 5,298, aged 72. Admitted August 22, 1916. For two years prior to his admission to

the hospital the patient had considerable urinary difficulty, with frequent attacks of acute retention. Rectal examination, on admission, revealed a large carcinoma involving the entire prostate and both seminal vesicles.

Treatment. From August 26, 1916, to November 1, 1916, 1,850 mg.-hrs, of radium were given per rectum and 100 mg.-hrs. per urethra. At the end of this time, there was no improvement in obstruction and a perineal prostatectomy was done for the relief of obstruction.

Microscopic. Sections of the tissue removed at operation show considerable fibrous tissue which is invaded by carcinoma in many places. The arrangement is that of adeno-carcinoma and the cells for the most part are very well preserved. In many areas are tubules which are filled with carcinoma cells which have a typical glandular arrangement. Many of the nuclei are pyknotic but there are no other evidences of any regressive change.

The post-operative course in this case was uneventful, the perineal wound closing at the end of four weeks. Urination was accomplished without difficulty, there was good control, and the patient could retain his urine for four to five hours. On discharge from the hospital, December 8, 1916, there was moderate induration in the region of the prostate which also involved the seminal vesicles.

Case VIII. No. 5,418, aged 66. Admitted October 5, 1916. The history in this case dates back one and one-half years, at which time there was a sudden onset of urinary frequency and urgency. These symptoms have progressively grown worse and for eight weeks prior to admission the patient had been voiding every fifteen minutes during the day and had nocturnal incontinence. Examination on admission showed a very extensive carcinoma of

the prostate and seminal vesicles. Residual urine, 850 c.c.

Treatment. From October 5, 1916, to November 22, 1916, 1,400 mg.-hrs. of radium were given per rectum and 300 per urethra. There was no improvement in obstruction and a perineal prostatectomy was done.

Microscopic. In none of the sections studied is there any change either in the cells or in the architecture of the tumor which can be ascribed to the action of radium. The tissue is typical of advanced carcinoma of the prostate.

The perineal wound in this case closed at the end of the third week, at which time the patient was retaining urine for four hours and voiding it without difficulty. Rectal examination on December 21, 1916, showed some induration in the region of the prostate, but the seminal vesicle had diminished greatly in size and consistence.

Case IX. No. 2,237, aged 61. Admitted September 4, 1915, with a history of urinary obstruction for six months. Examination on admission revealed carcinoma involving the right lobe and lower portion of right seminal vesicle. Radium treatments were immediately begun, the following external treatments being carried out:

September 15, 1915 — 1,965 mgs. applied to the perineum for ten hours, at a distance of four inches.

October 6, 1915 — 1,580 mgs. applied to perineum and back (sacrum) each for seven and one-half hours.

From September 15 to November 25 — 1,400 mg.-hrs. were given through the urethra and bladder.

As a result of this treatment, while there was very little symptomatic improvement, the prostate had diminished considerably both in size and consistence. On December 15, death occurred from a cardiac complication. Examination post-mortem showed no

invasion of the bladder, the carcinoma being confined to the posterior capsule and the right seminal vesicle.

Microscopic. The tissue which was removed at various levels shows typical carcinoma. The cells are for the most part quite well preserved and only rarely conform to the adeno-carcinoma arrangement. They are present in long strands between bundles of fibrous tissue which predominates. In many areas the cells are broken up and the nuclei pyknotic. The tumor, however, gives one the impression of being actively growing and only slight degenerative changes can be seen.

Case X. No. 4,954, aged 77. Admitted March 13, 1916, with a history of urinary obstruction for five years. For two years previous to admission he had been voiding from ten to twelve times at night. Examination revealed an extensive carcinoma involving the entire prostate and seminal vesicles. Residual urine, 250 c.c.

Treatment. From March 13 to April 1, 1,800 mg.-hrs. of radium were given per rectum and 300 mg.-hrs. per urethra. At the end of this series of treatments the symptomatic improvement was remarkable, urination being normal in every respect. Rectal examination showed no evidence of prostatic induration and one examining the prostate for the first time would say that the prostate was somewhat enlarged and somewhat characteristic of adenomatous hypertrophy but not at all suspicious of carcinoma. Examination of the seminal vesicles, however, showed very little change. They were still about the same size as formerly but had softened somewhat under the treatment. Because of rectal irritation, treatment was suspended until June 3. Cystoscopy at this time revealed no residual urine and no evidence of carcinomatous invasion of the bladder. The patient still remained free from

urinary symptoms. Radium treatment was resumed, and from June 3 to July 18, 700 mg.-hrs. were given per rectum. The patient remained free from symptoms until September 20, when he noticed the escape of urine per rectum. On admission to the hospital on October 4, examination revealed a great extension of the carcinoma which had ulcerated through the posterior wall of the bladder and rectum with the formation of a recto-vesical fistula. Death December 15. Autopsy.

Microscopic. Sections of the tissue show definite carcinoma in every portion of the prostate. The tumor is very cellular and the stroma, which is relatively slight in amount, is everywhere invaded. The carcinoma cells are found tightly pressed together in large clusters and the glandular arrangement is rarely seen. The cells, for the most part, are well preserved and the radium has produced apparently no change in the microscopic appearance of the tumor.

Case XI. No. 5,170, aged 67. Admitted June 1, 1916, with a history of urinary frequency for one and one-half years. For two months before admission he had been voiding three to four times at night. Examination on admission revealed an extensive carcinoma of the prostate and both seminal vesicles.

Treatment. Radium treatment was begun immediately and during the first six weeks he received 1,400 mg.-hrs. per rectum. He returned to the hospital in September, examination showing a marked extension of the growth with metastases to the spine. Death November 4, 1916.

Microscopic. The sections which were made from all portions of the prostate show typical carcinoma. The carcinoma cells are well preserved and no changes due to radium can be demonstrated.

Case XII. No. 5,299, aged 72. Admitted August 22, 1916. This patient gave a history of urinary

frequency and difficulty in voiding for three years. For a month before admission, he had been catheterized once or twice daily, the residual urine being from 500 to 800 c.c. Examination at the time of admission revealed a definite carcinoma of the prostate with questionable involvement of the seminal vesicles. The residual urine was 450 c.c. and cystoscopy showed marked irregularity of the prostatic orifice suggesting carcinomatous invasion.

Treatment. During the first series of treatments from August 22 to October 3, 1,700 mg.-hrs. were given per rectum and 200 mg.-hrs. per urethra. At this time there was slight symptomatic improvement and general softening of the gland. The second series of treatments began December 4. From this time to January 2, 100 mg.-hrs. were given per rectum and 200 per urethra. Symptomatically there was very slight if any improvement, the residual urine remaining the same, and on January 15 a punch operation was done for the relief of urinary obstruction. This was followed by a good functional result and the patient has been voiding freely ever since.

Microscopic. Examination of the tissue removed at operation shows definite adeno-carcinoma. No changes in the sections can be ascribed to the action of radium.

Remarks.

As to the great diversity of clinical effect and cellular change produced by the radium treatments given in the preceding cases, we have no explanation to offer. We have given at length the good with the bad results.

Radium Treatment of Bladder Tumors. In the application of radium to bladder tumors the patient is prepared as for cystoscopy. For tumors in the region of the vesical orifice and trigone, an

nstrument very similar to that employed for the treatment of prostatic carcinoma is used. It is, however, a tubular instrument through which an observation cystoscope can be passed, thus enabling the operator to apply the radium accurately to the tumor. (See Figs. 12, 13, and 14.) For tumors upon the anterior and lateral walls, the instrument just described is sometimes unsatisfactory, as the tip of the radium capsule and not the long diameter comes in contact with the tumor. To obviate this difficulty, another type of instrument was devised, as shown in Figs. 15, 16, and 17. It is seen to possess a beak composed of two hollow halves, and an intermediate shell in which the capsule containing the radium is placed. By a simple screw mechanism, the halves can be separated and thus the shell containing the radium swung out so that its long axis lies parallel to the shaft of the instrument. This instrument also carries a cystoscope, making accurate applications possible. Neither of the above instruments is suitable for some tumors lying on the posterior wall. For the treatment of these another design was necessary. (See Figs. 18 and 19.) This will be seen to resemble in general outline the instrument first described, except that its beak, which is fenestrated, serves as a capsule for the radium. By means of wires concealed in the shaft of the instrument this beak can be made to revolve about its center so that its long axis can be brought to a point at right angles to the long axis of the instrument. The radium can thus be placed broadside upon the tumor. (See Figs. 20 and 21.)

In carrying out these treatments we have usually employed a capsule of brass, one side of which is fenestrated, the diameter of the fenestra being about one-third the circumference of the capsule. Both the beta and gamma rays are thus utilized, the fenes-

trated surface of the capsule being placed directly upon the tumor.

As in treatment of carcinoma of the prostate, it has been our plan to map out the area to be treated and to outline each treatment together with the date and dose given. (See Fig. 22.) After the radium has been carried to the desired point the instrument is held in a fixed position by the mechanical arm employed in the treatments described for carcinoma of the prostate. The length and frequency of the treatments varies considerably with the individual case, but as a rule the radiations can be given for a period of an hour once or twice a week.

This report includes forty-five cases of tumor of the bladder treated with radium alone or a combination of radium and fulguration. Of these cases fifteen were papillomata, thirty carcinomata. Of the papillomata only two were treated with radium alone, the one receiving 350 mg.-hrs., the other 50 mg.-hrs. Both tumors disappeared within three weeks after radiation.

In thirteen cases of papilloma a combination of radium and fulguration was employed. In seven cases the actual effect of the radium cannot be stated. The tumors disappeared but it is possible that many would have responded to fulguration alone. In the remaining six, however, the radium played apparently a very definite rôle and it is with a consideration of these cases that we are chiefly concerned. These were all papillary, pedunculated tumors, presenting cystoscopic appearances similar to the type of tumor which usually responds to fulguration. In two of these cases specimens were obtained with our cystoscopic rongeur. Both sections showed histologically malignant change in the periphery of the tumor without infiltration, the changes being entirely in the epithelium, there being no evidence of infiltration

of the axis of the papilla. In these six cases, the tumors were first treated by fulguration and in all of them the response was either entirely negative or extremely slow. Following a fulguration the tumor might appear as a charred mass and it would seem certain that complete destruction had been effected; yet, upon cystoscopy ten days or two weeks later, the tumor would appear clean, active, and of approximately its original size. Repeated fulguration met with the same result, although in one of the cases the treatment was carried out at two-weekly intervals over a period of six months with practically negative results. Radium was then applied directly to the tumor, from two to six hundred mg.-hrs. being given. So far as could be determined there was little if any cystoscopic change as a result of the radiation. Upon returning to fulguration, however, the response was very prompt, the tumor disappearing in one to three treatments.

The following cases are examples of the type of papilloma resisting fulguration, responding promtly, however, to this method of treatment after radiation:

Case I. No. 4,894, aged 72. Admitted April 23, 1915, giving a history of hæmaturia for several months. On cystoscopic examination a tumor about one inch in diameter was seen back of the right ureteral orifice. The tumor did not project markedly into the bladder, was rather pink in color and the papillæ short and stubby. From the cystoscopic appearance alone, it was difficult to rule out an early papillary carcinoma. From a specimen obtained with our rongeur, histological sections were made showing the ordinary malignant papilloma without infiltration, there being no invasion of the axis of the papillæ, the malignant changes being confined to the epithelium alone. Fulgurations were begun at weekly intervals and continued over a period of six months. The tumor

appeared very resistant and at the end of six months it was at least three-fourths its original size. The tumor at times was vigorously fulgurated so that it appeared as a charred, blackened mass, yet upon returning two weeks later nothing would suggest that any treatment had been carried out. The patient was then given six applications of radium of one hour each (600 mg.-hrs.) during a period of about eight weeks. In these applications the fenestrated capsule was used, thus utilizing both the beta and gamma rays. At the end of this treatment the tumor appeared possibly slightly smaller but the change was not striking. Fulguration was then resumed, the tumor was thoroughly charred, and when the patient returned for examination ten days later the cystoscope showed the tumor had completely disappeared. No other treatment was given. Six months later the patient died of pneumonia. Examination of the bladder post-mortem showed no evidence of recurrence; the mucous membrane was smooth and section showed no evidence of cancer and the pelvic organs were negative for metastasis.

Case II. No. 5,244, aged 71. Admitted July 17, 1916. This patient gave a history of hæmaturia beginning four years before. Because of marked bleeding and consequent urinary difficulty, suprapubic cystostomy was done a few months after the onset of symptoms. At operation a bladder tumor was found which was treated frequently by fulguration without result until admission to the hospital. Cystoscopy showed a large, lobular, irregular tumor occupying the right lateral wall. The tumor was clean, there being no areas of necrosis, and the adjacent mucous membrane normal. From July 18 to August 3, the patient received four radiations to the tumor, totalling 200 mg.-hrs. The treatment was resumed August 17, and from this time until September 23 five

radiations totaling 300 mg.-hrs. were given. Fulguration was then begun, the tumor disappearing after two applications. This patient was last seen February 8, 1917, at which time he was entirely free from urinary symptoms. Cystoscopy at this time showed no evidence of recurrence.

Carcinoma of the Bladder. Our results of radium treatment of the infiltrating type of malignant tumor, from a curative standpoint, are most unsatisfactory. In our series of thirty cases, in no instance was there any evident response to the radium, nor so far as we could determine was fulguration influenced by preceding radiation as in the tumors just mentioned. In a few instances hemorrhage has been controlled, and in one case with extensive involvement in the region of the vesical orifice there was marked improvement in urination. The application of radium in these cases has been made directly to the tumor, and in cases with trigonal and posterior-wall involvement rectal radiation has been employed.

Conclusions.

The use of radium in the treatment of carcinoma of the prostate and seminal vesicles in many cases has resulted not only in marked symptomatic improvement but in definite reduction in the size and consistence of the tumor. In several of the treated cases subsequently coming to operation, it has been possible to secure prostatic tissue for microscopic study. Some of the adequately treated tumors (those obtaining from 1,200 to 4,000 mg.-hrs.) show extensive destruction of the cancer cells throughout large areas. In other areas the general architecture of the tumor is altered and the cells and nuclei appear in varying stages of degeneration. The histological change in several of the tumors is most encouraging

and it seems probable that radium treatment may have a distinctly curative effect in some of them.

The internal use of radium either by urethra or bladder, or by rectum, by accurate methods of control and fixation, would seem to be productive of far better results than the employment of much larger amounts externally, the chief difficulty of the latter method being the greater distance between the portal of application and the tumor.

The irritating effect of radium, which was formerly the great objection to its use in the urethra and rectum, can be avoided by the accurate methods of use which we have introduced, if the dose is carefully regulated and if care is used to avoid too frequent application to any one spot. The discontinuance of treatment at the first sign of rectal irritation cannot be too strongly emphasized, for if the treatment be carried beyond this point serious burns may result. Frequent rectal examinations may reveal a thickened rectal mucosa which may be the first evidence of irritation. With the onset of rectal irritation the urethral and vesical radiation may be substituted. The urethral and vesical mucosa is apparently quite resistant to the action of radium and in our series no ill effect has been noted following intensive treatment from these points. In these cases, however, it is well to mention that we have always employed a screen of 1½ mm. of platinum.

The determination of a safe interval between the disappearance of rectal symptoms and the resumption of treatment will vary with the individual case, the severity of the symptoms, their duration, the amount of radiation producing the original irritation, and the character of the rectal mucosa. Cases having had rather severe and prolonged symptoms should be held for two to three months before rectal treatment is resumed. Where large amounts of radiation have

been tolerated, finally resulting in more or less irritation, the interval between the disappearance of symptoms and the resumption of treatment should be much longer than in those cases showing evidence of irritation after a few hundred milligram-hours.

The results obtained in the radium treatment of bladder tumors have been most satisfactory in the malignant papilloma type which have failed to respond to fulguration. Certain of these cases have resisted most stubbornly the high-frequency treatment, but finally responded promptly to it after a few hundred milligram-hours of radium. In our hands the treatment with radium of the infiltrating types of malignant tumor has been less encouraging, and in no case in which there was definite infiltration of the bladder wall, as demonstrated either by cystoscopy or by rectal palpation, has a cure been effected.

In radium we undoubtedly have a most potent agent capable of producing marked changes in malignant tumors, as shown both by physical and microscopic examination. That some cases may be completely cured seems probable, though more time must elapse before accurate final determinations can be made.

It seems to be proven beyond doubt that close apposition of radium to tumor is very desirable, and that really marvelous absorption of infiltration, disappearance of induration, and reduction to normal size and consistence may occur in even extensive cases of cancer of the prostate and seminal vesicles by the accurate instrumental methods here employed.

DISCUSSION

OF PAPER OF DRS. YOUNG AND FRONTZ.

DR. EDWARD L. KEYES, JR., New York: I am sure I only voice the sentiment of all of you in expressing the deepest appreciation of Dr. Young's demonstration here before us. I personally have had no experience whatever with the use of radium in the prostate. But my associate, Dr. Barringer, has had the use of radium at the General Memorial Hospital in New York City, using methods somewhat different from those of Dr. Young, more precise I think in some ways, perhaps less precise in others, and has achieved results which are quite similar. So that, while Dr. Barringer differs from some of his methods, still I wish you to carry away the major impression that we agree entirely with Dr. Young that the radium does influence carcinoma of the prostate and carcinoma of the bladder in a most extraordinary degree. How long that influence will persist, doubtless Dr. Young will be good enough to tell us a year or two from now. It is impossible to speak of any permanent cure at the present time.

First of all, as to the difference in method. Dr. Barringer has used the emanations from radium, not the radium itself. So far as I can make out, the emanation from radium in its action upon neoplasms is precisely the same as that of radium itself. In his applications *upon the prostate* Dr. Barringer has used at first steel needles, and lately gold needles. He has not as yet made up his mind as to any difference in clinical results between the two sets of needles. He gets his emanation, has it measured, and then inserts the needle into the perineum, under local anæsthesia, and with a finger in the rectum inserts the needle right into the midst of the prostatic growth. He leaves forty, sixty, or eighty millicuries of radium emanation in a spot which he usually terms a lateral lobe; that is, he directs it to one side of the median line, and puts it at the place where he thinks it will do the most good, and leaves it from four to six hours — a much longer application, you will notice, than that employed by Dr. Young. There have been no surgical complications, except temporary retention of urine. The needle is left from four to eight hours and reinserted in the opposite lobe of the prostate. The patient therefore has to go into the hospital in the morning, have his reinsertion at mid-day, and then stay in the hospital over night to take care of any ensuing retention

of urine; then he is permitted to go home. That is a great deal more irradiation to the prostate than any single one made by Dr. Young. The radium is put in the midst of the growth and is left there a much longer time.

The immediate result, except for possible retention, is nil. In from three to ten days the patient usually, though not always, has a certain amount of discomfort in the perineum. This varies from a slight to considerable discomfort, and the duration varies from several days to three weeks. During that time the prostate definitely swells up and shows inflammation from the definite burn it has received. In some of the early cases the reaction was unnecessarily severe. With progress and experience Dr. Barringer has learned to control the reaction, so that now it is usually of no moment. A repetition of these doses is made only after about three months, not at repeated short intervals as in the method of Dr. Young. The greatest number of applications in any one case has been five.

Dr. Young seems to claim relief of retention of urine coincident with the shrinkage of the prostate. This relief we have not experienced. I should have been willing two months ago to say that we have never experienced it, but for a recent exception. A patient came for radium treatment after two weeks of acute complete retention. In a week or two, to our surprise, he discarded his catheter and had to get up only once at night. This happy state has continued for several months.

Dr. Barringer has not pretended to such precision in the treatment of bladder tumors as has Dr. Young. He has observed as precisely as possible where the growth was in the bladder, has introduced two radium capsules through the sheath of the cystoscope, and then has put the patient in such a position as would throw the radium capsules against the growth. He has used the two capsules to minimize burning. He has used it a shorter time in the bladder, from four to six hours. He has treated twenty-five cases of carcinoma of the bladder, and in four of these the radium has removed the growth. One of these has been cystoscopically proven controlled for eleven months, one for five months.

The following case is interesting: This patient was fulgurated twice before she came to us, having had symptoms for a year and a half. She was sixty-nine years of age. She had a diagnosis of inoperable carcinoma. The cystoscope showed a large red carcinoma, with necrotic patches, on the left side of the bladder. The tumor was near the left ureteral orifice, and was about the size of a fifty-cent piece. Dr. Ewing reported on a speci-

men — "small alveolar carcinoma, showing inflammation, dilated blood vessels, the cells irregular in size; large nuclei arranged in small groups; stroma scanty." An application was made of one hundred millicuries of screened radium for eight hours. Three weeks later Dr. Barringer brought her to the office for the purpose of demonstrating the tumor to Dr. Jeck and myself, and we were unfortunate in not being able to see it. It was gone. That application was on January 19, 1916. On December 16, eleven months later, there was no tumor visible, and the bladder appeared normal.

Among the prostatic cases — there were thirty treated — nineteen were advanced cases. Definitions always change. Previous to radium one would have called an advanced case one that had exceeded the prostate itself. Now we class as advanced only those that have gotten up into the pelvis farther than you can feel, or that show extensive involvement of the bladder or of the vesicles. From one patient I removed a tumor suprapubically, supposing it to be a bladder carcinoma, but found it to involve the prostate. Radium was then given twice, and there is no recurrence either in the bladder or prostate, as far as can be ascertained six months later.

Of the early cases there were about eleven. Six of these eleven are distinctly better, and the remaining four cases have been too recently treated to report upon. The first case that we treated I will read to you:

"Case 1, aged 59. Loss of strength and flesh; night frequency, three or four times, for four months. Pain in right thigh for five years. Prostatic examination by Dr. Keyes: Large, hard, irregular prostate, which appeared about as large as an English walnut. Left side more prominent. Little extension toward the seminal vesicles. October 20, fifty millicuries in the left lobe; right lobe same day. Three months later, feels well; return of erections. Marked shrinking of carcinoma at the end of third month. Second application at the end of third month, sixty millicuries, five hours. A month or so later had gained five pounds more. Third application, thirty-eight millicuries, right side, eight and a half hours. Fourth application, seventy-five millicuries, four hours each side. Fifth application, February, 1917, because there is a slight ridge along the edge of either lobe of the prostate and a little thickening in the vesicles."

He is well, at work, sometimes fifteen hours a day. He has retained his eighteen pounds of gain in flesh, and has no symptoms.

DR. GUSTAV KOLISCHER, Chicago: I would like to take up a few practical points in Dr. Young's paper. I agree with him fully that in a certain percentage of cases the application of radioactive substances will furnish results. Once in a while the results are astonishing.

As to the microscopic evidence of these changes following and supposed to be due to the application of radioactive substances and the *x*-rays, described abroad and in America, they are absolutely identical with those that spontaneously occur in tumors, karyokinesis, pyknosis, etc. There is only one thing that proves anything and that is when we cannot find any cancer any more. Everything else is a scientific cloak behind which to hide our failures.

As to the technique of the application of radioactive substances, Koenig and Goss described seven years ago a method of applying it anywhere in the body and keeping it there. Most of the appliances were very simple. It does not do much good to place a radioactive substance in the bladder by means of complex instruments, even if it were possible to place it just where you want it, because the bladder would contract or become distended and change the relation of the capsule to your tumor. If you insert a filter with mesothorium or radium, all you have to do is to let the patient urinate frequently, or catheterize him, and the bladder contracts around your radium. All you have to do is to take a simple sound and attach a filter. The capsule does not have to be very thick, provided you use a gold filter. It corresponds to a sound of about 22F. In a woman use a straight sound. In order to be sure you are near the site of the tumor, the application is by means of the fluoroscope, or if you want to show pictures afterward, you fill the bladder with some contrast fluid and take an *x*-ray picture.

Now as to the duration of the application, the burns that are produced are due to faulty technique. The prevention of burns is based on two principles: one is the proper filtration, and the second one is the prevention of secondary irradiation. If you have to deal with a mucosa that is rather sensitive to any kind of rays, *x*-rays or the rays emanating from radioactive substances, you have to protect the mucosa from secondary irradiation by putting a thick rubber cover over the filter. Furthermore, if you want to ray the prostate or seminal vesicles from the rectum, there is a very simple way of preventing burns. Over your filter you slip a cap made out of lead, with a little window. The part that is covered with lead faces the posterior wall of the rectum, and there is absolutely no irradiation. Through the

window the rays emanate opposite the prostate and seminal vesicles. If you filter properly you never will produce a burn.

There is another point: Short applications of radium or *x*-rays are very dangerous, because we know in so many instances the tumor is excited to excessive growth. If you want to use radium or mesothorium with safety, you have to apply enough of it for a great length of time. We never use it unless we leave it there twenty-four hours. The average quantity we use in the bladder varies from forty to one hundred milligrams. We figure it in this way: if we have to deal with a large infiltrating tumor, we use a large quantity; if with a small tumor, we use a small quantity, simply for this reason, because we know if you influence any tumor by irradiation you produce a certain amount of proteolysis, and if these proteolytic bodies are put into the circulation the patient may be poisoned. If we have a very large tumor there is not much danger of the proteolytic substances getting into the circulation, but there is, in the case of a smaller, circumscribed tumor.

As to measurement: The term milligram hours is not sufficient. If we do not know the radioactivity of the radium we are using, if we do not know the thickness of the filter, if we do not know the atomic weight of the filter, if we do not know the penetration, we cannot measure our dose.

As to the results: In bladder cases our results are very good, comparatively speaking. We have now on our records nine cases of inoperable malignant tumors of the bladder that are apparently cured — I say apparently cured, because the oldest case is only three years old — and at the present time we cannot find any evidence of malignancy.

Of cancer of the prostate: We have only two cases in which I am convinced we were dealing with cancer of the prostate. Our results have improved since we have been using enzymes. For instance, in one case of cancer of the prostate the patient had an enormous tumor of the prostate, so that you were hardly able to enter the rectum without striking the tumor right away. After this man had two mesothorium treatments and three enzyme injections, we were rather put to it to find the prostate, and the subjective symptoms have subsided.

So the question now is this: It is absolutely certain that in a certain percentage of cases we accomplish good or even marvelous results with radiotherapy and with injection of enzymes. Why do we not succeed in the majority of cases? We can only make real progress if we all do this work. It cannot be left to a few individuals or a few institutions. It is true that radium

and mesothorium cannot be had in a good many cases, on account of their price, but everyone can try to inject enzymes into the tumors, and you will be surprised in certain cases how quickly the tumors subside, and all the inconveniences connected with these tumors.

DR. YOUNG: It has been very interesting indeed to have this active discussion. I want to thank Dr. Keyes very much for bringing up the work of Dr. Barringer, which of course we would have referred to had we had time to do it. Dr. Barringer's work is undoubtedly very interesting and very wonderful and very excellent. In connection with his associate, Dr. Janeway, who is in charge of the radium work at this hospital, they have done wonderful work, and there is no question about it that in all probability the injection of radium directly into the lateral lobes of the prostate is of distinct value. Unquestionably it can more definitely reach the tissue around it than by any method which acts from the outside.

I would like to point out, if I may, from my slides, a question which I think shows why both methods ought to be used. As Dr. Keyes has pointed out, Dr. Barringer inserts the tube containing the radium first into one lateral lobe and then the other, and in one case has repeated this four times, and in another five times — never exceeding five times, as I understand it. I think there is no question that it is extremely valuable for the prostate, but when you remember that many of our cases were high up, I think it would be dangerous and difficult to reach the upper portions of the seminal vesicles with the needle method. Therefore it seems to me the method of applying it through the rectum is very advisable indeed and cannot be really supplanted by the other scheme. There is no doubt that the two ought to be combined. This method can be used frequently. Our method is to do it every other day for a week, or until we have covered the whole field, whereas Dr. Barringer has used fifty millicuries for from four to six hours, which would be something like six hundred milligram-hours. One case, for instance, has had 2,125 milligram-hours per rectum and about 3,000 per urethram, and I think there is no question that, although separated by the thickness of the mucosa, we really get in more irradiation, and certainly the posterior surface of the prostate which is carcinomatous is closer to the rectum than to a needle which is inserted say an inch and a half. But Dr. Barringer's method ought to be used, and I am making arrangements to use it. I am awfully glad Dr. Keyes brought up his cases.

LYMPHOID BODIES IN THE PROSTATIC URETHRA AS AN EVIDENCE OF TUBERCULOSIS.

P. S. PELOUZE,
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This subject has interested me very much for the last three and one-half years. I feel a hesitancy in presenting a work as yet unfinished: it possesses so many features still unexplained and seems so improbable that it borders upon the impossible, but to me it is so real that often I find myself drifting toward a positivism that seems to allow of no exceptions.

When one studies tuberculosis, he had better be very wary, as there is no disease wherein time and numbers are more essential to a proper interpretation of findings, both clinical and laboratory. At the same time, there are but few diseases wherein early diagnosis is of greater importance, and any lesions or set of symptoms that will lead to early diagnosis grow in importance as they help to solve the conditions of greatest obscurity. This is particularly so of urogenital tuberculosis. It is probably safe to state that renal tuberculosis is rarely demonstrated in its first two years, and often not for five or six years. The treatments applied to tuberculosis of the bladder, prostate, and seminal vesicle before the true nature of the disease is discovered are usually about the worst that could be imagined, and often are calculated to induce a generalized tuberculosis. This, I think, will be admitted by most urologists and is ample argument for the closest study of the lesions I am about to

describe. My own belief, based upon studies during the last three and one-half years, is that, when present, they are invariably local manifestations of a more or less active tuberculosis elsewhere in the body, and yet time and future studies may show that there are conditions other than tuberculosis that can cause them.

If the cystoscope, with the lens on the convex surface, is inserted into the bladder, and, with the irrigating fluid flowing, the fenestration is drawn into the posterior urethra, it will be found that a very good view can be obtained, almost as good as that given by the cysto-urethroscope. By rotating the instrument so as to bring the lateral urethral wall into view, there will occasionally be seen a number of small, slightly pedunculated or sessile masses of tissue springing from a mucosa that seems little, if at all, inflamed. These bodies vary considerably in size, are of a pearly white, rarely red, color, and minute blood vessels can be seen traversing their smooth unbroken surfaces. At an early stage, these are apparently solid masses of tissue that later seem to undergo a cystic change. In this cystic stage they are easily ruptured, and a whitish substance exudes. When ruptured, they leave an abraded reddish surface, usually circular in outline, with a small shred of white tissue attached to the edge. Such areas may be the only evidences of urethral trouble and should excite suspicion. A future study will, in all probability, reveal the solid masses and the true nature of the condition.

While the location of these bodies is usually upon the lateral urethral walls, just distal to the vesical neck, they may occur upon almost any portion of the prostatic urethral wall or verumontanum. I have observed them, upon one occasion, just distal to the bulbo-membranous junction of the urethra. They also occur in the anterior trigonal angle and urethra of the female.

The magnification of the cystoscope for near objects, and the pressure of the irrigating fluid and instrument, however, mislead as to the true size of the lesions and the color of the mocosa, for, when studied at autopsy, the lesions are found to be minute excrescences, measuring from one to three millimeters in diameter. They are pink or yellowish in color and surrounded by a distinct red areola.

Histologically, as will be seen by the photomicrographs, they are typically tuberculous tissue and show the inherent tendency of such tissues to caseate. In the zones surrounding the areas of caseation, tubercle bacilli may readily be demonstrated.

A persistent search upon my part for a post-mortem specimen was unsuccessful. It has, however, been the good fortune of Dr. Alexander Randall, with his greater opportunities in this field, to find four such specimens. He has very kindly furnished me with a full description of the first specimens, from which I am pleased to quote as follows:

"Male, white, twenty-six years of age. Clinical diagnosis, pulmonary tuberculosis. Pathological diagnosis: chronic pulmonary tuberculosis (conglomerate and ulcerative); tuberculous pleurisy, enteritis, cystitis, urethritis, and nephritis (left), with the usual evidences of prolonged toxemia in other structures. Bladder and urethra: at the left ureteral orifice are found two or three small ulcerations, practically confluent, measuring 7 x 4 mm., and about 1 mm. in depth. The edges are slightly undermined, irregular, and partially necrotic. The ulcer base is fairly clean, dark red in color, with slight slough; there is a moderate amount of injection of the mucous membrane about this ulceration. Higher on the left wall of the bladder are found three small ulcers, the largest approximately 5 x 3 mm., while on the anterior wall, to the right of the mid-line, are four small isolated

ulcerations. The trigone supports one ulceration 1 cm. below the left ureteral orifice and of small dimensions, while on the uvula vesicæ a pin-head sized ulcer is found. There is no diffuse tuberculous cystitis. The posterior urethra presents a solitary ulcer on its left wall, measuring 5 x 4 mm. in extent, and similar in character to those in the bladder wall. Thickly spread over the posterior urethra, especially over the urethral trigone and right lateral wall, appear many small papillary growths or raised excrescences, usually about one to two mm. in diameter. These excrescences are a pale creamy white in color, and stand out sharply against air injected mucous membrane. They are found more or less thickly over the entire posterior urethra and verumontanum, but absent in the neighborhood of the above mentioned urethral ulcer. The prostate and seminal vesicles are grossly devoid of tuberculous involvement."

A section of tissue taken from the prostatic area of this specimen gives no hint of involvement beneath the mucosa. The accompanying photo-micrographs, made from these sections, show very clearly the character of the lesions.

In a previous article (*New York Medical Journal*, Oct. 16, 1915) entitled "New Growths of the Prostatic Urethra in Relation to Tuberculosis," I reported the histories and clinical and laboratory findings of nine cases. For the purpose of making the present report as complete as possible, I shall include these cases. For the sake of brevity they will be tabulated, as the previous histories are more or less similar.

That the condition is by no means a rare one is evidenced by the fact that in approximately 3,500 cystoscopies within the last three and one-half years, I have seen fifty-one cases. Of this number, I have had the opportunity to study forty-two cases, of which thirty-seven show reasonably certain evidences of

tuberculosis. Five are still being studied for further confirmation of a co-existing tuberculous focus. Nine of these cases were observed only once, and did not return for further study.

The most striking points in the entire group of cases are the following:

(1) Many were, or had been, in direct daily contact with cases of tuberculosis.

(2) Thirty-two had had a more or less recent specific urethritis.

(3) Almost all of this latter number were being treated for "chronic urethritis."

(4) The urine was usually clear but contained shreds.

(5) An associated follicular prostatitis was the rule.

(6) Frequency of urination was present in twenty-one cases.

(7) Burning pain in the fossa navicularis was present in thirty-five cases, usually only at urination. It was the most common symptom calling attention to the lesions.

(8) Burning pain at the vesical neck or in the perineum, either constant or intermittent, was present in nineteen cases.

From the standpoint of symptomatology, these patients can be very readily divided into four distinct groups:

Group I. Those cases with a previous history of gonorrhœa, entirely free from subjective symptoms, but with a morning drop and few shreds in the urine. These cases are discovered only through routine cysto-urethroscopic studies. Physical appearance rarely suggests tuberculosis.

Group II. Those cases, with or without a previous gonorrhœa, in whom there is a slight burning in the fossa navicularis upon urination, a morning drop, and a shreddy urine. The burning suggests the advisability

of study, and physical appearance only occasionally suggests tuberculosis.

Group III. Those presenting burning at the vesical neck and occasionally in the fossa navicularis, frequency of urination, an anterior discharge, and a shreddy urine. Physical appearance quite often suggests the nature of the malady.

Group IV. Those presenting any or all of the foregoing symptoms and a turbid urine. The first impression of these cases is that of a well-advanced tuberculosis. They are in the minority.

As to the entire significance of these lesions, I fear that it is too early to make a positive and final statement. Whether or not future studies will prove that they appear only in certain cases of renal tuberculosis is a question of much interest from both a diagnostic and prognostic standpoint. If time proves such to be the case, their finding will be a matter of the greatest importance to such patients, and that this may be the case is, in a measure, hinted by the results of my studies. Three of the patients under observation have developed unmistakable signs of renal tuberculosis that could not be found when they were first seen. The urethral lesions are, as a rule, what might be called "closed lesions," as ulcerated surfaces can rarely be seen. They probably are not a common factor in the appearance of tubercle bacilli in the urine, which is not an uncommon finding. There is little reason to believe that the underlying prostate is tuberculous, as the urethral mucosa alone seems involved, and, as I have been unable to find the bacilli in any of the expressed prostatic secretions examined, the natural assumption is that the gland is not a frequent source of the organisms. The same might be said of the seminal vesicles, as in only two of the cases presenting tubercle bacilli in the urine was there any evidence of disease of these structures obtainable. I am thus

Fig. 1.
The usual location of the urethral bodies (diagrammatic).

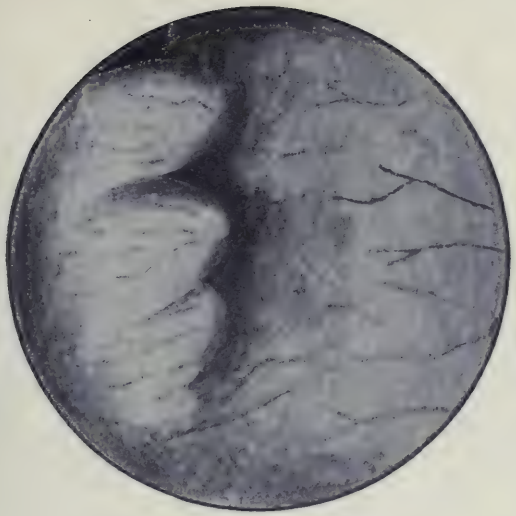

Fig. 2.
Cystoscopic appearance of the lesions.

Fig. 3.
Cystoscopic appearance of the lesions.

Fig. 4.

Cystoscopic appearance of the lesions, showing proximity to the vesical sphincter.

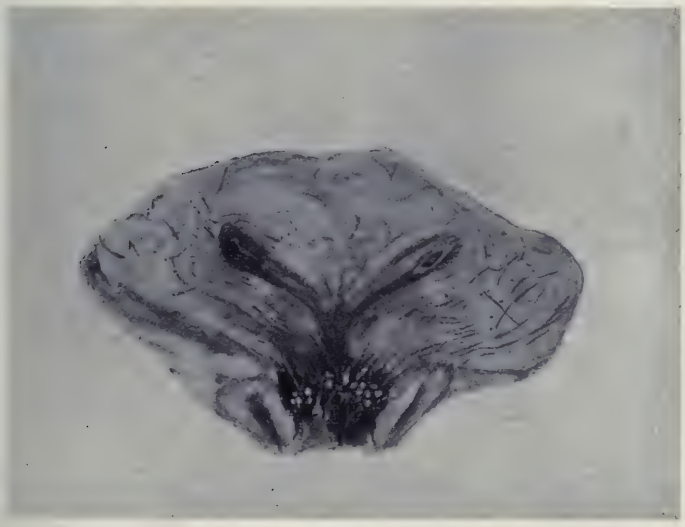

Fig. 5.

Drawing made from one of Dr. Randall's specimens. The injection of the urethral mucosa around the masses is distinctly seen. It is continued over the trigone, blending with a red area surrounding the right ureteral orifice.

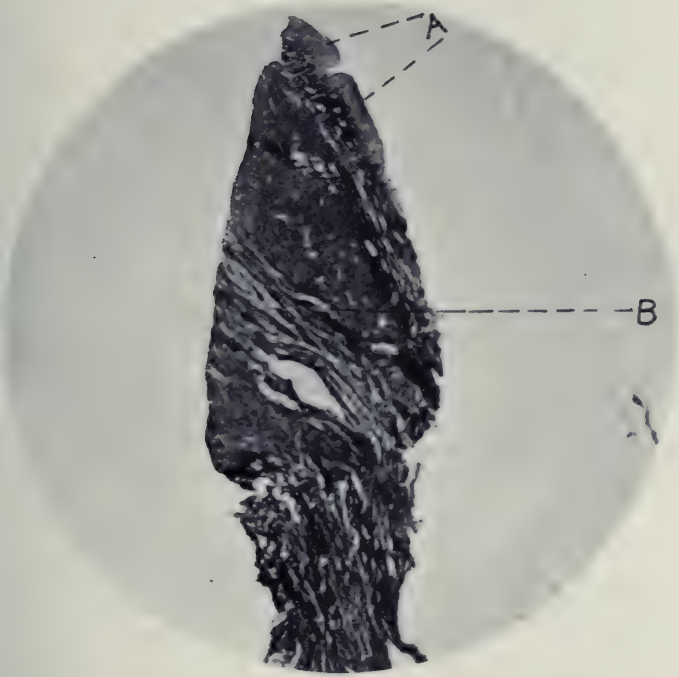

Fig. 6.

A — Urethral mucosa presenting two of the excrescences.
B — Portion of the anterior prostatic commissure.

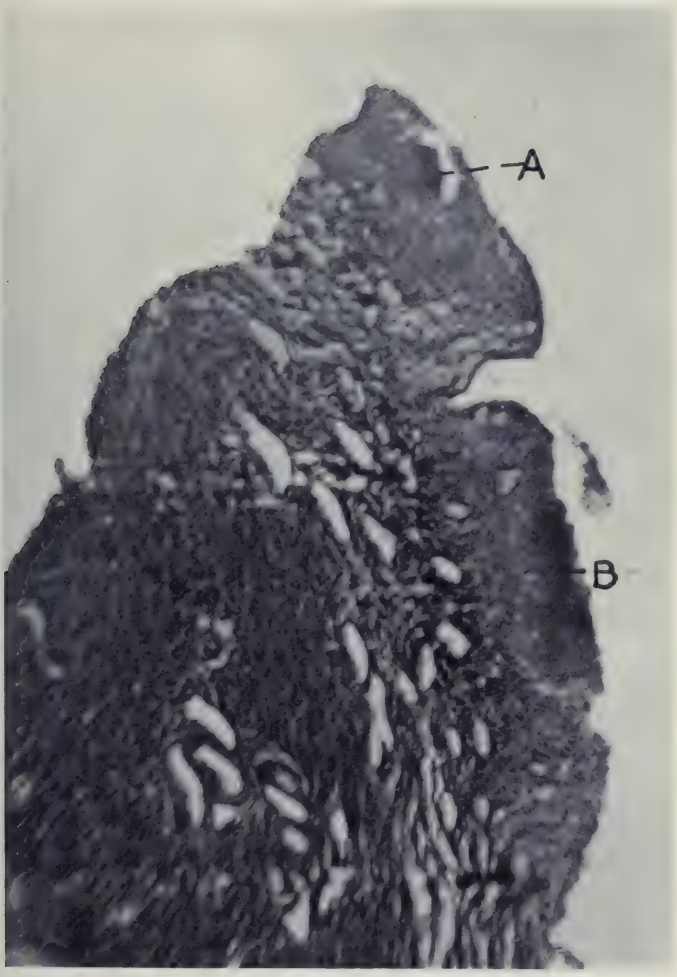

Fig. 7.
Higher magnification of Fig. 6, showing necrotic areas at *A* and *B*.

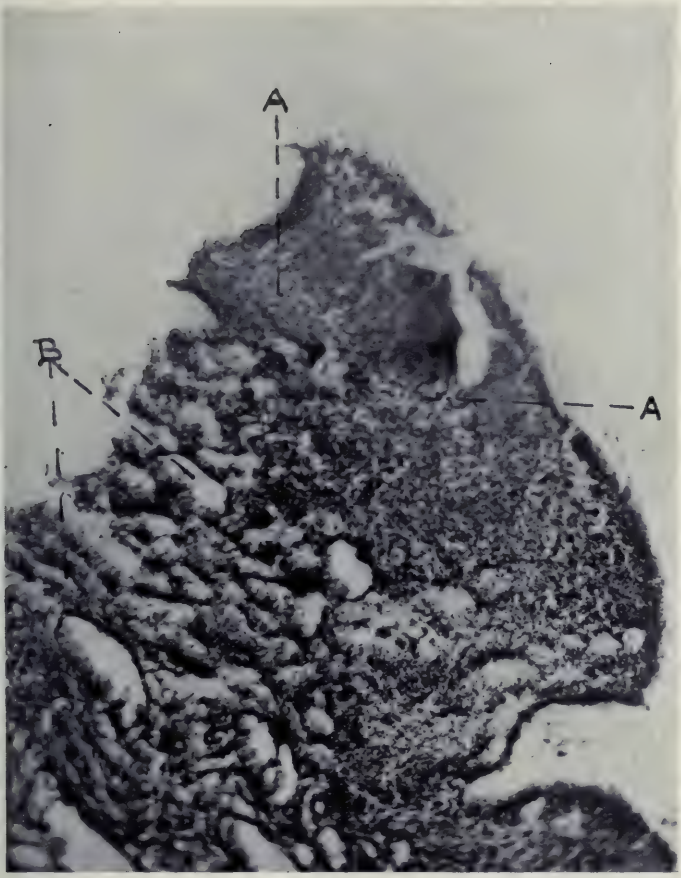

Fig. 8.

Still higher magnification of upper portion of Fig. 7.
A — Zones in which tubercle bacilli were demonstrated.
B — Normal prostatic tissue.

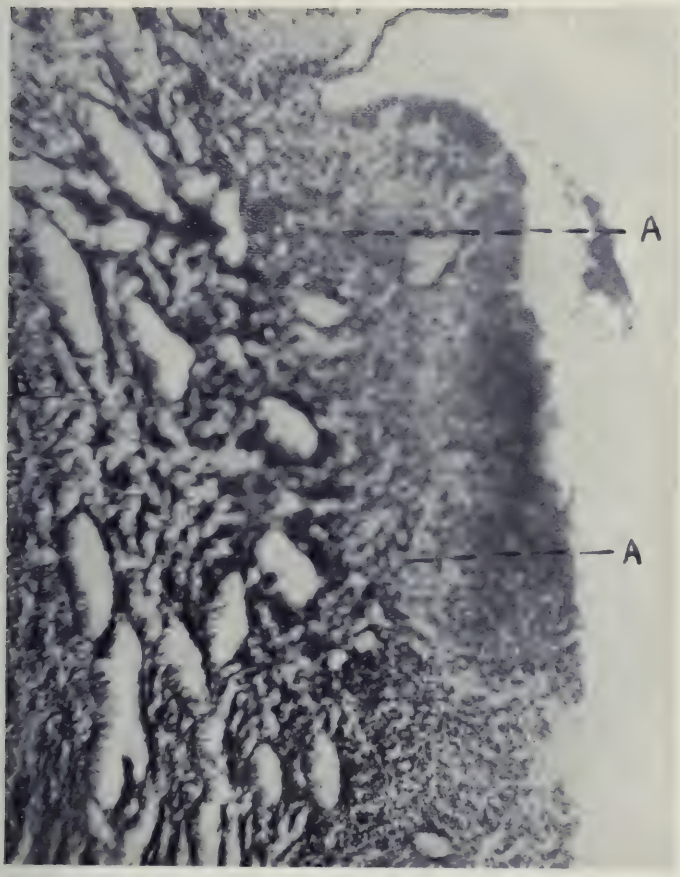

Fig. 9.

Higher magnification of lower portion of Fig. 7.
A — Zones containing tubercle bacilli.
B — Normal prostatic tissue.

Fig. 10.
Drawing from Fig. 8, showing tubercle bacilli in the tissue.

led to the conclusion that these bacilli come either from or through the kidney; that they can pass through a non-tuberculous kidney seems to be fairly well shown, but that they often do, is, I think, doubted by most urologists.

Although there may be tubercle bacilli in the whole urine when these lesions are discovered, it is often impossible to say that this or that kidney is the seat of disease, as the catheter specimens give no evidence of change, except, perhaps, an excessive number of small epithelial cells, the urea and phthalein outputs being evenly balanced. A slightly reddened ureteral meatus upon one side is often encountered, which, though significant, is only sufficient to cast suspicion upon that kidney, for if it is an evidence of disease, it appears before such a lesion can be demonstrated by diagnostic means now at our disposal.

As will be seen by a study of the tabulated cases, the most frequent demonstrable accompanying lesion has been in the lungs, the kidney, the bladder, and the epididymis, in the order named.

From these studies, a number of more or less definite statements may be made by way of a summary:

(1) There are many cases of advanced urogenital and pulmonary tuberculosis in which these lesions are not present. They have, therefore, no negative value.

(2) They are not peculiar to the male, as Case XXV was a woman who presented the lesions in the anterior trigonal angle and urethra, and had many tubercle bacilli in the urine from each kidney. Several years ago, I recall having removed by fulguration similar growths from the urethra of a woman, under the impression that they were papillomata. This woman now has a moderately advanced tuberculosis.

(3) At least 80% of these patients were in apparently robust health and had never been suspected of any form of tuberculosis.

(4) I am of the opinion that these bodies appear very early, and they apparently persist throughout the entire course of the tuberculosis. They have been found in the mildest as well as the most advanced phases of the disease. With two possible exceptions, they have not disappeared in any of the cases I have been able to follow, and where the cystic forms have been entirely broken up by instrumentation, they have recurred in less than two months.

(5) From their absence one and one-half years after a nephrectomy in Case IX, it is evident that they bear the same relation to such an operation as does vesical tuberculosis, and are in no sense a contra-indication to it.

(6) There is evidence (Cases V and VII) to support the belief that persistent prostatic massage, though indicated by the co-existent prostatitis, has a decided tendency to light up tuberculous foci in other parts of the body, particularly in the lungs and epididymi.

(7) Probably 50% (or more) of all cases of chronic follicular prostatitis, which present, as a symptom, burning at the vesical neck or in the fossa navicularis on voiding, will show these urethral bodies, and have tuberculosis. This would suggest more than coincidence as to the rôle of gonorrhœa in encouraging tuberculous invasion. Following this thought, it is safe to say that any case presenting either of these symptoms, not directly due to some treatment or acute inflammation, requires a cysto-urethroscopic study, and to withhold it is to do the patient a gross injustice.

(8) Sufficient time has not elapsed to venture an opinion as to prognosis, but it has been abundantly impressed upon me that most of these patients do very well if local treatments to the urethra and prostate are avoided, and anti-tuberculous treatment is instituted.

(9) Thirty-seven out of forty-two cases studied showed strong evidence of tuberculosis, and three of the autopsy specimens found by Dr. Randall were from patients dead of the same disease. One of these specimens has been studied microscopically and shows many tubercle bacilli in the tissue. Sections of tissue removed from the urethræ of two of the living patients show tuberculosis with demonstrable bacilli. Therefore it is felt that there is ample evidence to support the contention that these bodies are truly a manifestation of tuberculosis.

In these studies, I have been particularly fortunate in having the kind help of Dr. Randle C. Rosenberger with the laboratory studies. Drs. E. J. G. Beardsley and G. H. Clapp have assisted me in the medical aspects of the cases, and it is a pleasure to acknowledge my indebtedness to them. I desire, also, to express my thanks to Dr. Alexander Randall for his very kind and able description of the post-mortem specimen in his possession, to Dr. W. M. L. Coplin for the photo-micrographs, to Dr. R. M. Lukens for drawings, to Drs. H. R. Loux and J. Chalmers DaCosta for the privilege of reporting cases from their respective services, as well as Drs. T. C. Stellwagen, Jr., Charles W. Bonney, and W. H. Kinney for permission to study and report private cases of theirs.

PREVIOUSLY REPORTED CASES.

Case Number.	Increased Frequency.	Burning pain at vesical neck or in perineum.	Burning pain in Fossa Navicularis.	Tubercle bacilli in the urines.	Probable tuberculosis elsewhere	Remarks.
I.....	Yes	Yes	Yes	Yes	?	
II.....	Yes	Yes	Yes	Yes	?	
III.....	Yes	Yes	Yes	Yes	Yes	Advanced tuberculosis upper lobe, both lungs.
IV.....	Yes	Yes	Yes	No	Yes	Tuberculosis upper lobe, both lungs.
V.....	No	Yes	Yes	?	Yes	Tuberculosis of lung. Tubercle bacilli in urethral tissue.
VI.....	Yes	Yes	Yes	No	Yes	Tuberculous right kidney removed. Tuberculous left perinephritic abscess, persisting sinus; bilateral pulmonary.
VII.....	No	No	No	Yes	Yes	Active pulmonary tuberculosis, renal and epididymis.
VIII.....	No	No	Yes	Yes	Yes	Pulmonary tuberculosis.
IX.....	Yes	No	Yes	Yes	Yes	Tuberculous right kidney removed.
X.....	No	Yes	Yes	Yes	Yes	Tissue removed is typically tuberculous and contains bacilli. Extensive pulmonary lesion, apparently latent.
XI.....	No	No	No	Yes	Yes	Chronic pulmonary tuberculosis.
XII.....	Yes	No	No	?	Yes	Clinical evidences of tuberculosis of upper lobe of right lung. Marked loss of weight.
XIII.....	Yes	No	Yes	Yes	?	Probable left renal tuberculosis with marked pyuria.
XIV.....	No	No	No	Yes	Yes	Active pulmonary tuberculosis.
XV.....	No	No	Yes	Yes	Yes	Active tuberculosis of upper lobe, right lung.
XVI.....	Yes	Yes	Yes	Yes	Yes	Active pulmonary tuberculosis.
XVII.....	Yes	No	Yes	Yes	Yes	Pulmonary tuberculosis, now apparently latent.
XVIII.....	No	Yes	Yes	?	Yes	Tuberculosis of upper lobe, left lung.

XIX	Yes	Yes	Yes	?	Yes	Chronic pulmonary tuberculosis. Bilateral pyuria.
XX	No	No	No	Yes	Yes	Tuberculosis of both lungs, active. Tuberculous granulomata of bladder.
XXI	Yes	No	Yes	Yes	Yes	Hunchback. Tuberculosis of bladder, prostate, epididymis and probable kidney. Marked pyuria.
XXII	Yes	Yes	Yes	?	Yes	Extensive lesion of left upper lobe, active. Bilateral pyuria.
XXIII	No	No	No	?	Yes	Extensive chronic pulmonary tuberculosis.
XXIV	No	No	Yes	?	Yes	Tuberculosis of upper lobe of right lung.
XXV	Yes	Yes	——	Yes	Yes	Woman. Tubercle bacilli and pus from both kidneys.
XXVI	Yes	Yes	Yes	?	Yes	Tuberculosis of upper lobe of right lung.
XXVII	Yes	Yes	Yes	Yes	Yes	Typical tuberculous cystitis, probable renal. Chronic pulmonary tuberculosis.
XXVIII	No	Yes	Yes	?	Yes	Tuberculosis of upper lobe of lung, active.
XXIX	Yes	Yes	Yes	Yes	Yes	Old lesions in both lungs. Evidences of right renal-tuberculosis with bladder involvement.
XXX	Yes	Yes	Yes	Yes	Yes	Typical tuberculosis of bladder with undoubted left renal involvement.
XXXI	No	Yes	No	?	Yes	Pulmonary tuberculosis, active.
XXXII	No	Yes	No	?	Yes	Chronic pulmonary lesion. Now slightly active.
XXXIII	Yes	No	Yes	?	Yes	Lesion of upper lobe of right lung, probably latent.
XXXIV	No	No	Yes	?	Yes	Pulmonary tuberculosis in upper lobe of both lungs, active.
XXXV	Yes	Yes	Yes	?	Yes	Extensive chronic pulmonary tuberculosis. Renal, bladder and prostatic tuberculosis. Marked pyuria.
XXXVI	Yes	Yes	No	?	Yes	Great loss of weight, prostration, nightsweats for two months. Renal hæmaturia.
XXXVII	No	No	No	?	Yes	Probable pulmonary tuberculosis, also pleurisy.

THE VERUMONTANUM.

E. O. SMITH,
CINCINNATI, O.

Every one who has searched for an explanation of the function of the verumontanum has been forcibly impressed and disappointed at the painful silence of authors on this subject. This little rounded elevation in the posterior urethra has in it glandular tissue with a liberal blood and nerve supply. Transverse sections of the urethra through the veru show that it rises from the urethral floor and comes in contact with the sides and roof of the urethra. When in a state of erection it would come in still closer apposition to the urethral walls, thus closing the urethra at that place. This could occur normally when the nearby erectile tissues would be asserting themselves, and would be most pronounced during ejaculation, thus preventing a backward flow of the seminal discharge into the bladder. This is only an old suggestion, which no one seems to be able to either contradict or substantiate. It is not very likely that any of us will ever see the veru performing this function, as the presence of an endoscope in the posterior urethra is not especially conducive to sexual excitement with ejaculation. Arguing from the fact that certain abnormal and pathological conditions of the veru cause abnormal sexual excitement, it may be concluded that the veru acts as a sort of telegraphic station that sends the message farther back and the seminal discharge follows under normal conditions.

Be that as it may, it is certainly there for a purpose and is not to be classed as the vermiform appendix, which is removed whenever seen.

A rather extensive review of the literature has about convinced me that the verumontanum has not a friend on earth. It has been charged as being "the seat of nearly all, if not all, of the genito-urinary neuroses." What a happy solution this would be for these miserable sexual neurotics if this were only true. With the sole cause of sexual neurasthenia located in the veru, prompt, complete, and everlasting cure would certainly follow the removal of the cause. Conspicuous in many articles written on the veru and neuroses, after claiming the veru to be the sole seat of trouble, were statements that the patient was given a "heart to heart talk," — was "advised to desist from alcoholic and sexual excesses," or was "given a constitutional treatment." I am sure that it has occurred to every one of us that many of these patients have "apartments to let in the upper story," or "the governor belt slips," or they "need a balance wheel." Aside from this, it seems almost incredible that any well-informed urologist would have the audacity to claim for the verumontanum what we have been so dogmatically taught rightfully belongs to the seminal vesicles.

It would seem that the burden of all genital neurasthenia would be about enough for this tiny structure, $\frac{1}{8}$ by $\frac{1}{6}$ by $\frac{1}{4}$ inch in dimensions, to carry. Not so. It is also held responsible for a great many cases of chronic posterior urethritis. In fact this helpless little bunch of tissue is often subjected to capital punishment, either a slow death by the silver route requiring several cruel applications, or the more rapid and humane method of electrocution by two or three sittings with the Oudin current, or with one fell swoop it is guillotined.

Far be it from me to underestimate the value of any and all of these treatments. My plea is in defense of the veru, when it is not guilty; and before it is condemned to these heroic treatments, let us be positive that it is really involved and that such treatments are justifiable. In so doing there will not be so many failures following treatments directed solely to the veru.

Post-mortem Studies. Post-mortem examination of a large number of verumontana in conjunction with the prostate and seminal vesicles has led me to believe that our urethroscopes have misled us sometimes, or else our anxiety to see things has aided our imaginative minds to magnify trivial changes and at once jump at conclusions. I have yet to find post-mortem any of the fantastic distortions of the veru that I am sure were seen through the urethroscope, especially the water dilating cystourethroscope. Even "granulations," "ulcerations," and "papillomata" are conspicuously uncommon in the dead specimens.

The veru may be and is solely involved in a few conditions. Occasionally a small papilloma springs from the veru, while no others are in the posterior urethra. This may be very small yet cause many unpleasant symptoms, such as frequent urination, discharge of blood, and masturbation. These papillomata are best seen through the water dilating cystoscope, as the flowing water will cause the new growth to float into view. The ordinary endoscope or posterior urethroscope could easily miss a small papilloma that was lying flat on the mucosa. It is a good plan to first examine the posterior urethra with a simple endoscope, then with the water dilating cystourethroscope, and compare the findings. If something is discovered that was not seen through the endoscope, note size, location, etc., through the irrigating instrument and again examine with the endoscope to determine exact size, etc.

Infection of the sinus pocularis without infection of the prostatic ducts is possible but not very probable and certainly not very frequent. Why should infection show a predilection for the sinus pocularis and not invade the larger and more numerous prostatic ducts? While it is not very logical to expect such a thing to happen, yet it no doubt does occur occasionally. Before accepting this as the only trouble present, it must be conclusively shown that the prostate and vesicles are not involved.

A cyst may be attached to the veru and cause symptoms similar to those of a papilloma. The cyst can be recognized through the cystourethroscope and treated through this same instrument.

Among the complications that are due to the treatment of the veru are continued posterior urethritis. Did you ever have a patient come to you with symptoms of posterior urethritis and a history of long-continued posterior urethral treatments, and after leaving off the treatments entirely, or, for psychic effect, giving an occasional boric acid irrigation, watch him improve? Of course you have, and while you got the other fellow's patient, the other fellow was taking care of one of yours in exactly the same way and getting the same results.

Acute epididymitis is a rather frequent complication of heroic veru treatment. There is but one explanation for this and that is, there was some infection started down the ejaculatory duct that did not stop until it reached the small convoluted tubule of the epididymis. It seems that the rational method of attacking the veru would be with something mild and less liable to cause such pronounced complications. When the trouble is an infection it is necessarily in the sinus pocularis, and it is the sinus that should be treated, and *not* the exterior painted with silver. If there are granulations present they can easily be

removed with a few topical applications of silver, using a weak solution at first, gradually increasing the strength if necessary. It must not be forgotten that severe hemorrhage may be started with silver applications, especially the silver stick. This seems to be particularly true when the posterior part of the veru is thus cauterized.

The bladder may fill with blood, causing complete stoppage of the urine stream, which must be relieved by suprapubic cystotomy when other measures fail. Extensive and pronounced œdema of the posterior urethra has followed too vigorous treatment of the veru, causing urinary retention. This is usually overcome by injecting adrenalin into post-urethra and in thirty minutes a soft catheter can be introduced into the bladder. It occurs to me that it would be the part of wisdom to prevent many of these unpleasant and serious complications by being more careful and more gentle in the therapeutics of the posterior urethra.

Aside from the removal of papillomata and cysts from this region, I am firmly convinced that the fulguration current has no place. This treatment burns, dessicates, and is to be condemned as being applicable to the structure of the veru for that reason. Any severe burn is followed by a contracted scar, and in this locality the scar may include the ejaculatory ducts. Complete removal of the veru is justifiable only in those cases where every other treatment has failed and when one is positive that there is no further trouble in the prostate and seminal vesicles.

Referring again to the post-mortem studies, it was my observation in many cases where there was pus in the seminals or prostate, or in both, that the verumontanum was apparently normal. In no instance were there conspicuous evidences of infection or inflammation in the veru with both seminals and prostate normal.

From these observations and from a study of the clinical cases it appears that the veru is seldom alone the guilty or offending member. Inspection of the anterior portion of the veru will often reveal a reddened, congested surface when there is either an epididymitis or vesiculitis, the remote conditions in the epididymis or vesicles being reflected on the veru, very much the same as renal disturbances are reflected to the urethral orifice.

A chronic prostatitis will cause a swelling of the veru, while a chronic posterior urethritis will elevate and soften the veru.

I trust that many charges against the veru will in the future be withheld and that punishment will not be inflicted until guilt has been proven. In order that justice may be properly administered, it is necessary to make a careful investigation not only of the accused veru, but of its close neighbors and companions in crime, the prostate and vesicles, also the epididymis. If the preponderence of evidence points to the veru to the exclusion of the other organs, then let the veru suffer the penalty, even to decapitation *if necessary.*

PAPILLOMATA OF THE MALE URETHRA.

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During the past year the writer has had the privilege of encountering several cases of neoplasms of the urethra, among which were ten cases of papillomata of the various types, and on reviewing the literature he finds few recent reports of such cases. Now our men have been writing on weightier subjects, overlooking a very important and oft-occurring condition. Many good papers in which this subject was incorporated, were published many years ago by such men as Oberlander, Kollman, Rosenthal of Germany, Reboul of France, Klotz, Lydson, Marks, and others in this country; most of these papers were published previous to the last decade. Randall, I believe, had the latest article on this subject, in *Surgery, Gynecology and Obstetrics*, 1913. This fact prompts us to present the case histories of three cases with comments on the same.

Case I. M. P. M., March 18, 1916, aged 32. Occupation, accountant. Histories of urethritis one year previous. When first seen had a slight mucopurulent discharge in the morning. Had a slight tenesmus, with frequent and a slightly burning urination. Had a stinging sensation present before onset of urination. Patient very nervous. Shreds present in glass No. 1, 2, and 3. Prostate and seminal vesicle enlarged and tender on right side.

Endoscopy, March 20, 1916. At about the anterior peno-scrotal junction we found a stricture which

would only admit a 16 F. bougie. Up to July 1, 1916, he was treated with dilatations, prostatic massages, high-frequency electricity, and through and through instillations of silver nitrate, two times each week. All symptoms had disappeared July 1, 1916.

Returned August 1, 1916, complaining of a weight and tenderness in the region of the anterior peno-scrotal junction. Endoscopic examination revealed six papillomata in this region. Papillomata were sessile with numerous warty proliferations and fibrillations. The mucous membrane over the growths was pale and shiny — not broken at any point. The removal of tumors was recommended at this time.

Returned August 15, 1916, and submitted himself for treatment. We removed at this time two of the tumors with the rongeur forceps and submitted them for microscopic examination, to C. A. Wolferth, pathologist to the Youngstown City Hospital, which examination confirmed the diagnosis of papilloma. Up to the present time, January 15, 1917, patient has been under regular treatment — tumors being removed by fulguration and the rongeur forceps, with a continual recurrence. Thus far thirty tumors have been removed. Tumors extended along entire length of anterior urethra, and we would not estimate the number now existing, owing to many recurrences.

On December 24, 1916, one of the tumors was submitted for examination to Dr. Zeit of Chicago, when the same diagnosis was made, with the added notation, that some few areas are suspicious of malignancy but not definitely so. This was an old growth taken from the anterior urethra near the peno-scrotal junction.

In this patient the tumors have been very prone to recurrence and are still present. His symptoms have greatly subsided and his nervousness is greatly relieved. He still has a slight muco-purulent discharge, but no

hemorrhage except for twenty-four hours following treatment.

The examination of patient September 28, 1916, showed the urethra nearly free of tumorous growths. Due to the fact of my absence in the month of October, the patient was not examined until my return, November 3, 1916, when we found the entire anterior urethra literally covered with new tumorous growths, thus demonstrating the rapid recurrence of the same.

Case II. G. J., aged 28. Occupation, telephone lineman. Had urethritis continually for three or four years. Saw patient September 1, 1916. A slight muco-purulent discharge in morning with some burning on urination. Tenderness on palpation about 6 cm. from meatus. Palpation revealed a small mass in the urethra.

Endoscopic examination revealed a single sessile tumor with warty protuberances. Tumor was removed with rongeur forceps; the base was cauterized with 25% silver nitrate.

Patient examined December 15, 1916, showed no recurrence and all symptoms had subsided.

Case III. J. G. C., January 10, 1917, aged 32. Occupation, glassblower. Acute urethritis eight years ago. Was treated at that time by his family physician with no further trouble until six months ago. At this time he noticed a glairy mucous discharge, complained of some slight tenesmus at the vesical neck on urination and at times a slight hæmaturia. At the end of urination complained of pain radiating along the course of the ureters, a symptom I have found present in nearly every case of neoplasm of the urethra, due to straining at urination.

On examination with the Buerger cystourethroscope we found a true villous papilloma with pedicle attached near the right posterior edge of the verumontanum. This case bears similarity to a case

reported by Martin in *St. Paul Medical Journal*, Vol. 18, No. 6, 1916, and is of very rare occurrence. No treatment instituted at writing of this paper and therefore results not yet ascertained, but it is the intention of the writer to treat by fulguration.

These three cases show three varieties of papillomata occurring in the male urethra, — namely: the single, the multiple, and the true villous, a type commonly found in the bladder.

According to Marks in *American Journal of Urology*, Vol. 4, No. 12, 1908, it was his finding that the single papilloma is located in that part of the urethra between the anterior layer of the triangular ligament and the peno-scrotal junction, while the multiple or those in groups or "nests" are found near the meatus, and are usually associated with similar papillary exuberences on the glans and prepuce. The locations of the above forms of papilloma are governed by the anatomical structure of the urethra. For instance, papillæ are particularly abundant in the region covered with stratified pavement epithelium for a distance of about four centimeters from the meatus. Posterior to this the single isolated papillæ are found. The above statement, however, does not always hold true as to the location of tumors, because in Case I of the writer's it was found that the multiple papillomata were located in that part of the urethra where the single papilloma is usually found, namely, between anterior peno-scrotal junction and triangular ligament, while the single papillomata were at or near the meatus. Papillomata are usually sessile rather than pedunculated, with a surface visibly cleft and supporting visible papillary outgrowths, and are very readily diagnosed macroscopically — without any laboratory tests — namely, through a careful study with the urethroscope. They present themselves as a roughened, warty excrescence of a glistening, pale pink

color. The single differs from the multiple in that the base is thinner and presents thin delicate fibrillæ — while the multiple have a broader base and a cauliflower appearance.

A mistaken diagnosis should seldom occur to one skilled with the use of the urethroscope, and bearing in mind the fact that they are readily rubbed off their site of attachment and leave a freely bleeding base, insures a positive diagnosis. Care must be exercised, too, in this examination, when separating the growth from the site of attachment, the tendency of any laceration to produce hemorrhage, and ofttimes very violent hemorrhage, thus confusing and rendering an accurate diagnosis very difficult. Tearing of these growths is readily and very satisfactorily overcome by air inflation urethroscopy, by which their character and consistency is more readily and easily determined.

A microscopic examination of the growth should always be made to confirm the diagnosis and to rule out any malignancy or metastases which the tissues may be undergoing. The papillomata always occur on a free epithelial surface and on mucous membranes. Buerger of New York has found that papilloma of the bladder of long standing is greatly subject to undergoing malignancy, and we are of the firm opinion that this is very true of papillomata of the urethra.

Condylomata need not be mistaken, as they are readily distinguished by their volume, their firmer structure, and are found in many parts over larger areas.

Papillomata have for their site the anterior urethra and the bladder, while the fibroma or polyp has for its site the posterior urethra, except when papillomata occur in the posterior urethra, when they are of the true villous type.

The papilloma arises as a rule from the papillæ and the abundant vessels, which are found dilated and

lying in a connective tissue stroma, rich in embryonic cells. The existing papillæ have for a surface layer a pavement epithelium and their vessels are parallel to the long axis.

Papillomata posterior to the meatus cannot be diagnosed except with the urethroscope, as their symptomatology is similar to chronic urethritis, and we are convinced that in many cases no diagnosis is made through a lack of proper diagnostic facilities.

Treatment. The tumors may be removed by the rongeur forceps through the endoscope and cauterizing the base of the tumor with silver nitrate from a 25% solution, ranging to full strength. It is necessary to control hemorrhage by the use of adrenalin solution 1–1000. It is usually not possible to remove more than two or four tumors at a sitting in this manner, and not possible to treat these cases oftener than once in every two weeks.

When the tumors occur in groups or nests at the peno-scrotal junction they may be removed through a buttonhole opening into the urethra at this point and curetting them from the urethra and cauterizing the bases of the tumors as above. This is a somewhat dangerous procedure on account of the trauma and likelihood of serious hemorrhage. Since the more common use of the high-frequency cautery, or fulguration, we believe this to be the better way, but it must be used by skilled hands owing to the danger of burning too deeply, destroying the good tissue and getting a stricture from resulting cicatrix. We have used aluminum wire of gauge eighteen or twenty, flattened at the end and well protected by rubber covering to avoid sparking your endoscope.

Dr. Walker of London has an ingenious method of removing these growths, that of filing a V-shape notch in an endoscopic tube of the Young or similar type

and catching the tumor in the V and using the tube as a knife, clipping them from their base.

In concluding this paper the following vital features should not be overlooked, namely: Papillomata are prone to follow a chronic urethritis, or other iritation to urethra. They occur much oftener than suspected and every case of chronic urethritis should be examined with the urethroscope. Papillomata are prone to recurrence and to malignancy. A microscopical examination should be made to verify diagnosis.

Since preparing this paper Case III has been treated three times with the fulguration method and on examination March 28, 1917, shows an excellent result.

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DOUBLE URETHRA.

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One author has aptly styled the penis the most versatile member of the human anatomy in its variations from the regular type. From the double penis, as reported by Velpeau and Küttner, to the complete absence of the organ, as reported by Harris, we may have many degrees of abnormalities which cause no harm and may go unnoticed for years, unless the penis becomes affected by disease and the anomaly is then discovered by the genito-urinary surgeon.

There are three different types of this congenital anomaly recorded:

1. A double urethra in the essential meaning of the word.

This occurs in cases where a double penis is observed. It is a very rare condition and was, among others, described by Küttner, Larthroir, Volpe, Allen, Vallantyne, and Carl Beck (New York).

2. The superior or inferior fistula of the penis conforming with the meatus; there is a duct running along the upper or lower surface of the penis and ends either within the bladder or in a blind sack.

Stockmann compiled in 1897 fifteen such cases, but Burkhard found up to 1906 seven more cases, so that there are twenty-two cases recorded in the literature. In eighteen of these cases the duct was located on the dorsal aspect of the penis, and in only four on the inferior side of the organ.

Four cases are recorded where the meatus was close to the meatus of the urethra (Picardat, Poisson, Posner — Schwyzer and Löw); this will be the fifth case under this classification.

3. Paraurethral ducts communicating at least with one end of the urethra.

Fig. 1.
Double Urethra — meatus closed.

Fig. 2.
Double Urethra — meatus open.

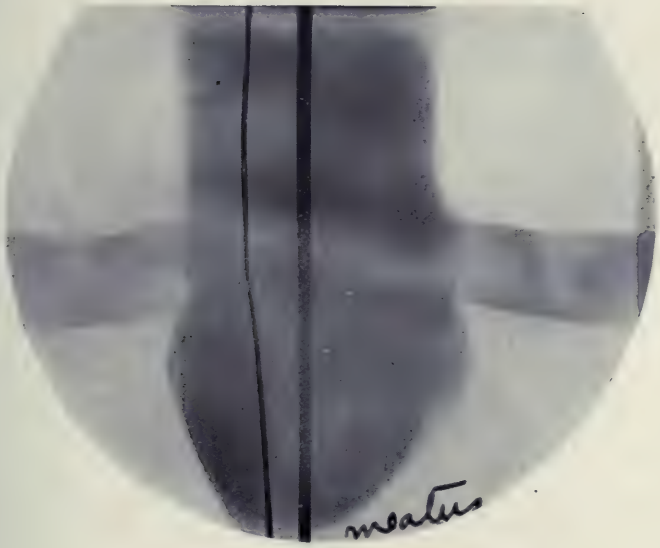

Fig. 3.
X-Ray with bougie in urethra and also in fistula.

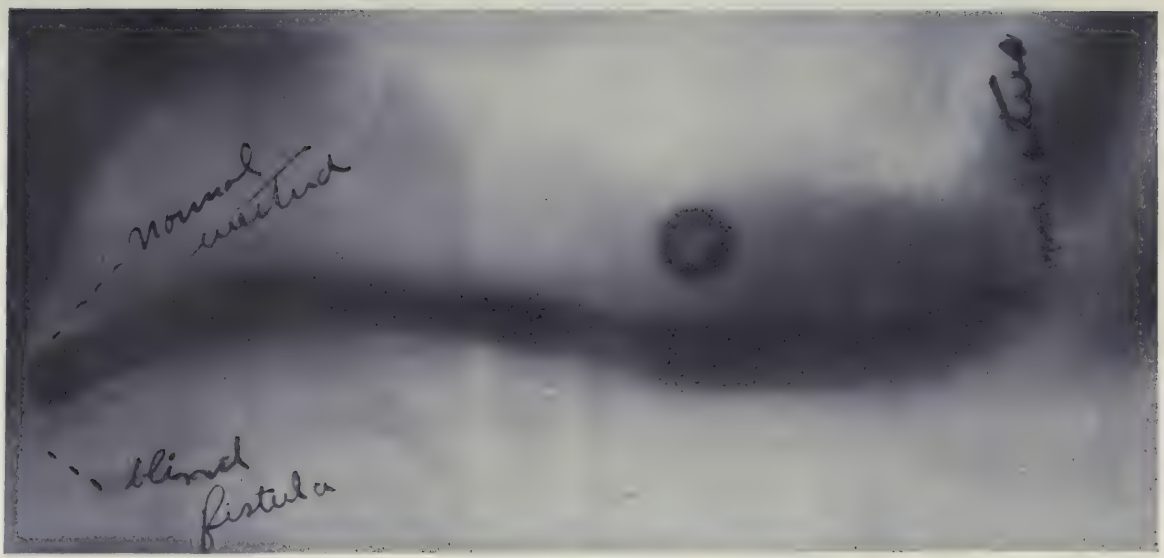

Fig. 4.

X-Ray picture of Normal Urethra and Blind Fistula, using 5% Argentide Solution.

DISCUSSION

OF PAPERS OF DRS. PELOUZE, SMITH, ELDER, AND CORBUS.

DR. W. F. BRAASCH, Rochester, Minn.: It is evident that the contribution of Dr. Pelouze promises to be a very valuable one for the early diagnosis of renal tuberculosis. There is no doubt but what early renal tuberculosis is frequently overlooked by many of us, because we have so few data whereby it can be recognized. Early renal tuberculosis may exist for some time without causing any subjective symptoms and without any evidence in the urine except possibly traces of albumin, and it may be months before the condition progresses so that we can recognize it by the usual methods of diagnosis. The paper also shows the value of a careful urethroscopic as well as cystoscopic examination in a good many of our cases, and there is no doubt that many data may be obtained by urethroscopic examination where the cystoscopic examination will be incomplete. It is also corroborative of the theory that tuberculosis of the genital tract originates in the kidney. If this were true the tubercle bacilli could pass from the kidney into the lower urinary tract and infect the prostatic urethra without involving the bladder. From the prostatic urethra the bacilli may be carried to the prostate and epididymis.

I would like to ask Dr. Pelouze whether he has had made guinea-pig inoculations where no evidence of renal tuberculosis was found other than in the prostatic urethra.

DR. CHARLES E. BARNETT, Fort Wayne, Ind.: It has just occurred to me — following Dr. Braasch's remarks about the origin of tuberculosis of the genital as well as the urinary tract being in the kidneys — in the genital tuberculosis it seems to me that we have the origin in a hematogenous infection of the epididymis, and we are more likely to get it from that direction than from the kidney.

Regarding Dr. Smith's theme in his whole paper, I think it is timely and a mighty good thought. I think there has been much ado about nothing in the treatment of the verumontanum, that the infection does come by way of the ejaculatory ducts and by way of the prostatic ducts, and the verumontanum merely is inflamed on account of its apposition to the infection. A number of years ago I found an atresia of the utricle in a dissection in Vienna — I could not prove by back pressure in the ejaculatory ducts or vas ampulla that it was a congenital atresia of the

utriculus masculinus, which would indicate that the atresia was due to an infection and closure. So I believe in the treatment of the veru that Kollmann dilatation, emptying out the prostatic acini and opening up the ejaculatory ducts, will do more good than any applications to the veru itself.

DR. GEORGE K. SWINBURNE, New York: I should like to speak on the verumontanum, because I first read a paper on it in 1908. I began the study of it in 1898. I want to say that I think Dr. Smith's paper is indeed timely, because I am of the opinion no strong applications should be made in the posterior urethra if there is any evidence of vesiculitis or prostatitis, and the form of trouble in the verumontanum that I have treated in many cases is a condition that does not come from gonorrhœa, and in very few of these cases is there any prostatitis to be found. I have never been quite sure in my mind what the cause is, but it is some superficial irritation to the posterior urethra and does not come from the prostate or the vesicles, and it may exist previous to a gonorrhœa, because I have had just as many cases of that condition in men who have never had venereal disease as I have in those who have, and they will sometimes give a history preceding their infection. Now if strong applications are made in the posterior urethra and the man has got a prostatitis or a vesiculitis you will very quickly get an epididymitis, and it is the last thing to be used, but I have seen a great many cases of sexual neurasthenia that have been benefited by strong applications, as strong as twenty per cent silver nitrate, to the posterior urethra. I have seen a good deal of harm, I think, come from applications as strong as the solid stick to the posterior urethra. I just simply wanted to emphasize that the posterior urethra should not be treated with strong applications so long as there is a prostatitis or a vesiculitis.

DR. JAMES A. GARDNER, Buffalo: Dr. Smith has acknowledged that he has been doing things that he should not do, and I wish to acknowledge that for some years in treating the veru I have been doing things that I should not have done, but it seemed to be the only way to cure the patient. We do not believe in treating cases where there is an acute prostatitis or vesiculitis. But there are certain cases in which I believe nothing is so effective as treatment with the stick and the twenty per cent nitrate of silver. In many cases of sexual neurasthenia we find large veru that resemble the wattles of a turkey gobbler. After treatment these cases come back and say, "Now, Doctor, you have done something

which has helped me." Certainly the veru is the seat of sufficient nerves that when irritated by a highly acid urine, or by secretions from the prostate or vesicles, or the colon bacillus, or from whatever source, the inflammation is prolonged, with the accompanying familiar train of symptoms, unless relieved by medicine. I believe, however, that the veru is needlessly treated many, many times. We are familiar with the young man who has just acquired an endoscope and discovered that abnormality in the back part of the urethra, and has been trying to cut it off or burn it off. Such follies are admitted, but there are times when the veru needs treatment and needs it very badly.

DR. ALEXANDER RANDALL, Philadelphia: Dr. Pelouze was so kind as to mention my name. I feel that this is a very important thing that Dr. Pelouze has presented to you, and it has been presented in a very conservative way, possibly too conservative. You have had presented to you, if it is what he thinks it is, an aid in making an early diagnosis of tuberculosis of the urinary tract that is far ahead of anything that we have had heretofore. He has pointed out to you several facts that I want to emphasize, after first speaking of the man himself and his work. When something new comes along we want to know who it is that does it.

It may possibly be startling to you that Dr. Pelouze presented fifty-four cases of this observation. You may have said to yourself, "I have never seen it, although I have been doing cystoscopy for years." Dr. Pelouze is connected with the most active genito-urinary dispensary and service in Philadelphia. He also occupies the enviable position of being cystoscopist to the hospital and cystoscopist for all the surgical services. He averages, to my own knowledge, although I am in no way connected with either him or his work, six or seven cystoscopies a day. So that when he tells you that in the last three or four years he has picked out fifty-four cases it does not seem so extraordinary. He has also entered this work with the attitude which we see in the writings of the older men in science, the men before our day, in that he has been his own severest critic.

Now, speaking personally from my own point of view, I heard of his work and observations, saw his work, saw what he had demonstrated, and accepted it with a scepticism which I think is inbred in every medical man, and it was the same spirit of scepticism with which everybody in Dr. Pelouze's own department and hospital, from the professor of pathology down, accepted it. His work has been so personally intensive, it has been so personally accurate and so personally hypercritical of each and every one of his findings, that now—and I think I speak possibly for a good

many more than myself when I say that he has convinced us of the correctness of his observations — when any of us to-day see these lymphoid masses in the posterior urethra we feel we are dealing with a patient infected with the tubercle bacillus. On the other hand all of us who have been tracing these cases have been stumped at times by finding them, thinking it was tuberculosis and yet being absolutely unable to demonstrate where the tubercle bacilli were coming from. I have been following one man since a year ago last February. I have had five twenty-four hour specimens examined. I have had guinea-pigs inoculated three times, and I have had his chest examined and it has been reported suspicious of tuberculosis. His functional tests have been taken on seven different occasions, with hardly a variation of two per cent between the two sides on each occasion. And yet in the face of all such negative data the mere fact that these lymphoid masses have been repeatedly observed in his posterior urethra is, from the work of Dr. Pelouze, sufficient evidence that this patient is harboring a tuberculous focus somewhere and it's up to me to find the lesion. So that some of Dr. Pelouze's conservatism is due to the fact that this does not possess negative value, and when it is positive you are just beginning, and the next step is to find out where the trouble is. It does not necessarily mean renal tuberculosis.

From a post-mortem viewpoint, we have the specimen which he has showed you, and three or four other specimens have been observed. We have likewise opened the eyes of other sceptics in that this whole subject has been overlooked by pathologists doing autopsies, and in their case I think it is due to the fact that the ordinary autopsyist does not care anything about the bladder, while the posterior urethra is an inviolable secret to all of them. In these specimens, three of them were from men who had active tuberculosis elsewhere in the body. In two of them there was no macroscopic evidence of tuberculosis in the urinary tract above. I have also seen three other cases of very active tuberculosis of the prostate, one of them with an abscess burrowing under the trigone, one with a localized abscess somewhat similar to what Dr. Thomas showed you, another one in which the whole prostate was the seat of miliary abscesses. It is of interest to know that in one of these latter cases the pathologist pronounced the kidneys before his class as an example of the rather unusual finding of perfectly normal (visual, of course) kidneys. That patient had an active pulmonary tuberculosis. The point I want to make is simply this, that these bodies (we call them "Pelouze bodies") when present mean

tuberculosis; though frequently the case, they do not necessarily mean renal tuberculosis; they apparently, in certain cases, are supported by foci of infection in other parts of the body than the genito-urinary tract.

DR. B. A. THOMAS, Philadelphia: I have been very much interested in Dr. Pelouze's work, and I think he is to be congratulated on it. His findings, if true, are certainly very important. I had to confess some months ago when he presented his paper that I had never seen these so-called "lymphoid bodies," as he describes them, at least in patients who presented no obvious urogenital tuberculosis or tubercle bacilli demonstrable in the urine. Certainly we have all seen tuberculosis of the posterior urethra, and we have seen tuberculous ulcerations in the posterior urethra in patients who exhibited urogenital tuberculosis elsewhere. I would therefore like to ask whether in these histopathological slides thrown on the screen any of the specimens were taken from living patients or were they all post-mortem, and whether, if post-mortem, the urine had been examined for tubercle bacilli irrespective of the post-mortem examination? I think that is a necessary link in the chain of evidence to absolutely confirm this work.

If Dr. Pelouze will excuse me I will report a case that he saw a year ago. Indeed when I saw the patient, learning that he was one of Dr. Pelouze's star cases, I could scarcely wait until I had cystoscoped him. He presented a condition that had been going on for eight years. His urine was one-fourth mucus and slime, and looked purulent, but as a matter of fact the entire cloudiness and detritus was due to amorphous and triple phosphates. Cystoscopy showed in his posterior urethra a condition which can best be shown by the colored drawings which I had made and which may be passed around. Now whether they are the conditions the Doctor saw in this case I cannot say, but I had to look at them several times myself. Had I not had the evidence of excessive phosphaturia I might have been uncertain as to the character of these remarkable views, but in my opinion they are simply phosphatic deposits at the vesical sphincter and in the prostatic urethra. I should therefore like to ask Dr. Pelouze if the "lymphoid bodies" described by him could have disappeared spontaneously in this case, with no amelioration of symptoms; or is it possible to confound these phosphatic deposits with his "lymphoid bodies"? Subsequently I had the patient's urine very carefully examined for tubercle bacilli by guinea-pig inoculations, but none could be found. *X*-rays resulted negatively. The functional tests of the respective kidneys were normal. One of the best tuberculosis experts in Pennsylvania

went over his chest, and declared that he could find no signs whatever in the lungs.

DR. EHRICH: I want to thank Dr. Pelouze for his paper, because it has cleared up a case which has been worrying me for a long time and in which no diagnosis was made. The cystoscopic picture was about the same as Dr. Pelouze has shown. Tuberculosis was suspected and the urine from the left kidney contained pus, but after several examinations no tubercle bacilli were found. The lungs were also negative.

In regard to the verumontanum, I disagree with Dr. Smith. I consider the verumontanum a very important factor in the urologic field. As to the treatment, I am opposed to strong caustic applications, and 10% silver nitrate solution is as strong as I ever use. In the use of silver or any other caustic that will cause actual destruction, there is danger of secondary contraction and the formation of scar tissue which will obliterate the outlet of the ejaculatory duct. The procedure that seems to me to be indicated in certain cases is verumontanectomy. I have used the Rytina instrument and enucleated the verumontanum in several cases and up to this time I have found no evidence of contraction.

DR. EDWARD L. KEYES, JR., New York: May I ask Dr. Pelouze whether he makes his diagnosis solely on the appearance of the masses or whether he excises a piece to confirm the diagnosis? In the second place, I would like to ask whether I understood him correctly to say that cauterization was useless.

Further, I should like to confirm the observation of Dr. Corbus that argentide is an irritating substance. I have used it once in the bladder, and had to visit the patient at his house for ten days thereafter in order to soothe his wounded spirit and bladder, and then I lost the patient. I haven't used it again in the bladder. It gives the most beautiful of all *x*-ray pictures, but it is a very irritating substance. Others have had the same experience. Argentide should only be used in the ureter and kidney pelvis, and even there it is irritating.

DR. PELOUZE: Answering Dr. Braasch as to guinea-pig inoculations in this series of cases: they have been very disappointing to me and I do not believe that in cases of this kind you can rely upon such inoculations. For instance, Case IX showed tubercle bacilli in every sample of urine obtained. (What I am calling a tubercle bacillus is a long, curved, solid or beaded bacillus which retains its red stain after prolonged exposure to acids and alcohol and will withstand the bleaching action of glacial acetic acid and

sweet spirits of nitre. I disregard short, solidly staining rods.) The sediment of a twenty-four hour urine was injected into the peritoneal cavity of a guinea-pig and a week later another such inoculation was made into the groin of the same pig. This little animal did unusually well and when sacrificed four months later, showed absolutely no microscopic or macroscopic evidences of tuberculosis. The right kidney of this patient is now a museum specimen at the Jefferson and is tuberculous. A year after operation this patient showed no urethral lesions.

In some experimental work done by Dr. R. C. Rosenberger and myself, six of a series of twenty-two pigs that were given an intraperitoneal inoculation of 1 c. of a heavy emulsion of a laboratory culture of human tubercle bacilli failed to show any evidence of tuberculosis at autopsy.

Webb has shown that it usually takes twenty-five or more virulent human tubercle bacilli to infect the average guinea-pig. There are not that many in most of these urines. If you find from five to eight you have done well.

I think the true value of these lesions is that they are usually found in cases that we have been treating for chronic follicular prostatitis and have brought about no improvement. Most of them will complain of burning in the fossa navicularis on voiding and a cystoscopy will reveal the urethral bodies. It may be some time before the tubercle bacillus can be found in the urine, but a chest examination will usually reveal a positive or very suspicious picture of tuberculosis. I do not know why these masses are here but they are in a number of cases.

Dr. Randall's kind remarks are very much appreciated and his interest in the subject has been a source of much encouragement in my work. He mentioned these lesions having been called "Pelouze bodies" but I am unable to trace any resemblance unless they are thinking of my bald head.

Dr. Thomas asked if the slides were made from the living or dead. The slides were made from the prostatic area of the first autopsy specimen found by Dr. Randall, of which I show the painting. As to whether or not the urines in these cases were studied for tubercle bacilli, I am unable to say. They were cases autopsied at the Philadelphia Hospital. Three of them died of tuberculosis. Dr. Thomas was kind enough to mention to me the case he intended bringing up in the discussion. When you raise a serious question about one of these cases you cast a doubt upon them all. To settle the question regarding this case I wish to call your attention to history number E7207 from the Jefferson Hospital, which is dated a year before I had ever seen the

patient. The marginal note, under which it is card indexed, reads, "Tuberculosis of the lungs." His provisional diagnosis was "incipient tuberculosis and phosphaturia" and he left the hospital under the same diagnosis. His best weight was 180 pounds and he then weighed 155 pounds. He had had a cough for five or six months. Dr. Pratt, one of the most careful chief residents we have had at Jefferson, made a diagnosis of pulmonary tuberculosis, as did also Dr. Beardsley. There was positive von Pirquet, if that means anything, and a negative Wassermann. The *x*-ray findings were positive.

Dr. Thomas mentioned that one of the best men in the country went over this patient and found no evidence of tuberculosis, and I would like to read you a personal letter written to me by this same man regarding the case in question:

"Your letter of the 28th instand to hand. I saw Harry Smith for the first time on September 5, 1916. He then had a tuberculous infiltration and some fibroid changes in the right upper lobe, tuberculous infiltration of the apex of the right lower lobe and of the apex of the left upper lobe. The disease was of a very chronic nature but the symptoms were typical," etc.

This case is number 19 of this series and the findings are tabulated, "Frequency of urination, burning pain at the vesical neck and at the fossa navicularis." As to tubercle bacilli: "Chronic pulmonary tuberculosis; bilateral pyuria." I was never able to demonstrate the tubercle bacillus in his urine. There can therefore be little question about our being justified in assuming that this case is truly one of tuberculosis.

Dr. Keyes has asked whether the diagnosis was made by the cystoscope or sections. By the cystoscopic view. I have not been radical enough to say to the patient, "You have tuberculosis" just as soon as I found that he had these lesions, but have felt it fairer to place him under suspicion and search further for his co-existing focus.

As to treatment, I said that they did well after local treatments were discontinued. I have found tubercle bacilli in these masses removed through the cystoscope — this section from the autopsy specimen shows plenty of them—and it has appeared to me unwise to massage a diseased prostate when you know its contained urethra harbors tubercle bacilli. I am, however, watching some of the men in Philadelphia who have more courage for treatments than I have, and when they find a good form of treatment I am going to adopt it, but until then I am going to keep my hands off.

DR. SMITH: The cases that Dr. Swinburne spoke of as having a superficial inflammation and some irritation in patients who

had not had a urethritis were the result, in many instances, of sexual and alcoholic excesses, in others due to frequent ungratified sexual excitement. I think before attacking the veru in these cases, one had better have the patient correct his habits. It probably is true that some of these sexual neurasthenics improve after severe treatments of the veru — a sort of a psychic effect. The treatment produces a local effect, there is no doubt about that, also a more or less psychic effect. Dr. Gardner's patients who have acid urine causing this condition should be given alkaline medication.

I do not want to be misunderstood and have my remarks interpreted that I do not believe the veru should ever be treated. I believe it should be — I mentioned that several times in my paper — *when necessary*. I am a strong advocate of conservatism in the treatment of the verumontanum.

THE USE OF THE HIGH-FREQUENCY SPARK IN THE TREATMENT OF MEDIAN BAR OBSTRUCTION.

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When one speaks of median bar obstruction of the vesical neck one means an elevation of the outlet causing an interference with the emptying of the bladder. This elevation takes place at the apex of the trigone, and is due to an inflammatory change, submucous glandular hyperplasia, or median prostatic hypertrophy.

I do not include in this series, cases of hyperplasia of any portion of the prostate gland other than the median lobe — cases of small fibrous prostate forming a complete ring about the vesical neck, or general carcinoma.

We have, then, an obstruction caused by a minimum amount of tissue at a point which gives a maximum amount of obstruction. The relief of such a condition consists in the destruction of the tissue causing the obstruction. Open operations for the attempted removal of the obstructing tissue are unsatisfactory because of the difficulty and often impossibility of the removal, the tearing, and the resultant cicatrix.

The results obtained by the destruction of the obstructing tissue by applications of the high-frequency spark, applied through the cystoscope — results extending over a period of six years — are such that it seems permissible to make definite state-

ments concerning the applicability and the possibilities of the method.

A correct diagnosis of the lesion is first necessary. The absence of lateral lobe enlargement, anterior lobe enlargement, complete fibrous ring, acute prostatitis and vesiculitis, and a nerve lesion, should be established. If, by process of elimination, a diagnosis of median bar obstruction is established, a period of preparation should be entered upon.

The length of time necessary for the preparation of the patient for local operative procedure depends entirely upon the conditions present — the general physical condition of the patient, the condition of the intestinal tract, the condition of the urinary organs, the presence or absence of local infection, the amount of residual urine, and the extent of the tissue to be destroyed.

The preliminary treatment consists in placing the patient in the best possible condition, and includes regulation of the diet; attention to the bowels; hot saline enemata to assist in the stool and to relieve the congestion of the prostate and vesical neck; sometimes gentle prostatic massage; a diurectic; a urinary antiseptic which does not irritate; occasional catheterization; instillations to relieve the inflammation, if present, and to stimulate the bladder.

If not distinctly indicated by the presence of infection, or of several ounces of residual urine, the less local manipulation the better.

When the patient is in the best possible condition, general and local, the first application should be given. If the local congestion has been reduced there is seldom acute sensation at the vesical neck; local anæsthesia, therefore, is often unnecessary. If a local anæsthetic is used, novocain, in strengths of from 2 to 4 per cent, with adrenalin, 1 to 16,000, is to be preferred. An opium and belladonna suppository

may be inserted into the rectum one-half hour before treatment. Several ounces of the novocain should be placed in the bladder, and the entire urethra may be filled with the solution, which is allowed to remain for thirty minutes.

The only cystoscope that I have found satisfactory for this work is a small caliber (18 F.), indirect, close vision instrument. As the manipulations are carried out at the vesical neck, little space is available. A large cystoscope completely fills the outlet. With the small close vision cystoscope, manipulation of the wire is not difficult, and the parts are in focus. A deflector is necessary to manipulate the wire and to hold it firmly against the bar in starting the cutting. It is not necessary, in the average case, to inject over three ounces of fluid into the bladder after it has been irrigated. If the bladder is more completely filled there is apt to be pressure on the vesical neck, while complete relaxation is to be preferred.

The smallest insulated steel wire is used. The spark (Oudin) is tested before inserting the wire, and can be strengthened after starting to cut through the bar. I prefer a light spark with longer application to a heavy spark with a short application. The end of the wire should be carefully adjusted before starting the cut, and should be in contact with the inner margin of the bar. The current is turned on. Bubbles form and fill the field. By injecting a little fluid through the side cock, the field is cleared. As a rule, one complete cut is made without withdrawing the wire, and no more applications are made at the first sitting. The total application may be for three minutes. The wire is withdrawn, the bladder is gently irrigated, and the cystoscope is removed.

If the manipulations have been carried out gently there should be no bleeding. A V-shaped cut is seen, lined with gray slough.

The after-care consists in avoiding exercise for several days, keeping the bowels free, and administering urinary antiseptics. The patient may have slight congestion after the application, requiring one or more catheterizations, but this is never necessary unless there may have been a considerable amount of residual urine before treatment. Catheterization should be carried out as gently as possible. Local treatment should be avoided if possible. After four or five days the patient will experience more freedom in voiding, and flakes of cast-off tissue will be noted in the urine. Later a distinct slough may be passed in one piece.

The second application should not be made until the urine is clear and there is no irritation while voiding. At this time the applications are made to the sides of the first cut, thus widening the furrow. These applications should be made in the same manner as the first. If infection should be present, or should take place after the treatment, the residual urine, if present, should be drawn off regularly, and a small amount of a mild antiseptic, as one per cent argyrol, left in the bladder. Mild urinary antiseptics are often preferable to urotropin, which may cause irritation. A clear intestinal tract is important, as the infections are nearly always due to the colon bacillus.

Often two applications are sufficient for immediate relief, and a rest of several months should be allowed; an observation should then be made, and further applications given if necessary. The number of applications required depends upon the character of the tissue to be destroyed, whether fibrous or glandular, and the amount necessary to be removed in order to give a furrow, of the level of the base of the bladder internally and the floor of the urethra externally, which will remain open when the patient

voids. Each case must be treated according to the individual requirements, and all should return for observation at regular intervals.

The median bar has consisted, so far as it was possible to ascertain, of thickened, œdematous mucous membrane; of a connective tissue layer beneath or involving the mucous membrane; of inflamed submucous glandular tissue and infiltration; of hypertrophic glandular tissue; or of hypertrophy of the sphincter.

In another type of cases the elevation was due to early hypertrophy of the median prostatic lobe, without lateral lobe enlargement.

A third type of cases presented a nerve lesion, and the bar was caused more by a dropping away of the bladder than by the formation of new tissue.

Many of the first class of cases had a history of a gonorrhœal infection of the prostate and vesicles, the symptoms — pain in the deep urethra, frequency, burning, and poor stream — dating from that time. In the majority of cases of this type I believe the new tissue formation to be inflammatory in origin, possibly an extension of a long-continued peri-urethritis, prostatitis, and vesiculitis, where the infection has been cured, leaving a dense layer of new-formed connective tissue, or proliferation of the mucous membrane at the apex of the trigone. In some of these cases a fibrous infiltration has resulted from traumatism from instrumentation and too vigorous massage; in others, from continuous irritation from a small amount of residual urine which becomes periodically infected from a bacteriuria.

Of the first twenty-five cases of median bar previously reported, and now extending back six years and up to two and a half years ago, there were thirteen of the first class, the obstructing tissue undoubtedly being inflammatory in origin. These

cases have all remained cured since the original applications. Three other cases were tabetic. Two of these have been relieved, the residual reduced, and the greater ease of voiding has continued to the present time. The third case has disappeared from observation. When last seen, two and a half years ago, he had come down from catheter life to one catheterization a day.

In nine of the first twenty-five cases the obstruction was due to middle lobe hypertrophy. Four of these cases have gone five years without treatment, and are able to empty their bladders. One has not received additional treatment for four, another for three and a half, and a third for two years. The remaining two of the nine have shown lateral lobe enlargement. The destruction of the median lobe in these two cases has allowed the enlarging lateral lobes to drop into the vesical orifice and to interfere with voiding. This has taken place in one case four years after treatment; the second has had continued treatment at one-year intervals. In both cases prostatectomy is advisable.

These cases are the earliest type of prostatic hypertrophy, and while the removal of the median lobe may result in permanent relief, in a certain number the lateral lobes will enlarge, drop into the opening more easily because of the absence of the resistance of the median lobe, and will come to prostatectomy at a later time. Therefore cases of this type cannot be considered permanently cured, and should report regularly once a year for further observation.

In this original series of cases, besides the twenty-five cases of median bar mentioned above, reports were given of all types of vesical obstruction treated by this means. In those other than median bar cases this treatment has proven to be palliative only.

While it is often of decided value in this rôle, it should not be considered when prostatectomy is possible.

In the new series of cases, forty-seven in number, the results obtained have been more satisfactory than in the early ones, due to the more careful selection of cases; to the preparation of the patient for treatment; to improved technique, and to periodical observations.

In the first class of simple median bar obstruction there have been twenty-six additional cases. The ages of the patients varied from twenty-seven to sixty-five years:

Age	Cases
Under 30	1
30 to 39	4
40 to 49	14
50 to 59	3
60 to 69	4
	26

Residual urine	Cases
No residual	2
Under 30 c.c.	5
30 to 49 c.c.	9
50 to 79 c.c.	5
80 to 99 c.c.	2
100 to 150 c.c.	2
Complete retention	1
	26

These patients were given from one to eight applications, with the following results:

Symptoms relieved; residual eliminated	15
Symptoms relieved; residual reduced to negligible quantity	4
Symptoms improved; residual eliminated	5
Symptoms improved; residual reduced	1
Symptoms unimproved; residual reduced	1
	26

In the last case (symptoms unimproved; residual reduced) we had to deal with a contracted bladder and an active bacteriuria.

In the second group of cases (median bar, with small median lobe hypertrophy, without lateral lobe enlargement) there are sixteen cases:

Ages	Cases
40 to 49	3
50 to 59	4
60 to 69	6
70 to 79	3
	16

Residual urine	Cases
50 to 79 c.c.	6
80 to 99 c.c.	5
100 to 150 c.c.	4
Retention	1
	16

These patients were given from two to six applications, with the following results:

Symptoms relieved; residual eliminated	6
Symptoms relieved; residual diminished	6
Symptoms improved; residual diminished	4
	16

Two cases of tabes have been treated, with improvement of the symptoms and reduction of the residual, one from 18 to 6 ounces, the second from 10 to 2 ounces.

Two cases of scirrhus carcinoma should be added to this series, as the carcinoma formed a distinct bar, without marked enlargement of the prostate. Both cases have been greatly relieved of their frequency, tenesmus, and painful urination. The residual has been diminished, one after two and a half years, the other after six months.

The work with the high-frequency spark was started, and the results had been sufficiently satisfactory to warrant its continuation, when Young published his excellent results with the punch operation, in 1912. The object of both methods was to find a means of relieving these cases of urinary obstruction where general prostatic hypertrophy was not present by means other than operative procedures, the results of which had been so unsatisfactory.

In one type of cases, formerly treated by the spark with little permanent success, I am now employing the punch. This is the hard fibrous ring about the vesical neck. Here it is necessary to remove from four to six pieces of hard fibrous tissue at different points laterally and anteriorly as well as posteriorly, in order to release the vesical neck. I have found the punch very satisfactory in this class of cases. When there is an anterior lip as well as a posterior lobe, the punch is to be preferred.

While the punch might be applied in many of the cases enumerated above, the spark has definite advantages when properly employed. All but four of the later cases are private patients, in whose treatment extreme care has been exercised as to diagnosis, preliminary treatment, application of spark, and after-care. None of these patients have been confined to bed before, during, or after the applications. There have been no complications. I do not often advise this treatment in clinic patients because of the length of time it is necessary for them to be under observation, and the lack of co-operation in details. It may be better to put the patient to bed, use the punch, and keep him confined until healed.

The advantages of the spark in the simple median bar cases are:

(1) The patient is not incapacitated.

(2) The work is accomplished by sight, without pain or hemorrhage.

(3) No raw surface is left after the application; infection will not take place if asepsis is maintained during the operation; the amount of tissue destruction is definite; there is no resultant cicatrix. Subsequent observations show a smooth, permanent furrow.

(4) Added applications are made after the slough has come away, so that the amount of destruction necessary is carefully ascertained.

MEDIAN BARS AS FOUND AT AUTOPSY.

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I fear there is very little uniformity of opinion as to what constitutes, and what we individually mean, when we speak of median bar formation. There are already some nine different titles used by various authors to designate apparently the same condition, and a review of the literature leaves one's mind in a rather confused state of misinformation.

However, on close scrutiny one finds that the symptomology is well understood, the diagnosis easy and well defined, and the treatment definite and its results good, so that we are left with but the gross and microscopic pathology, and the terminology, as bones of contention and misunderstanding. What does the man mean who writes of "Sclerosis of the Internal Sphincter"? Is he writing of the same condition as the one whose title is "Contracture of the Vesical Neck," or he whose title is "Atrophy of the Prostate," or perhaps "Atony of the Senile Bladder"? I personally believe that they are all speaking of one and the same condition, as they individually meet it in their patients — that is, clinically — and the one criticism that I would make of the majority of these contributions (and titles) is that they are based on clinical experience alone, unbacked by pathologic study of the diseased tissues, and yet have had applied to it titles that signify the pathologic changes that are present, or are supposed to be present. Clinical

terminology is very valuable and especially descriptive, but a very fickle mistress if not wedded to pathology, and its use here has led to the confusion of ideas as to the pathology of median bar formation. This confusion would have been avoided if others had only followed the lead of the original observer and had applied but a pure clinical phrase or title, "Bar Formation," until they had some definite microscopic work on which to base their assumption that it was a certain pathologic change.

I thought when I undertook this work (which consists of the gross study of prostates and bladders as they came to autopsy, irrespective of age or clinical diagnosis) that I had a very good and clear idea of what a median bar was, its appearance, its topography, its consistency, et cetera, and I was fortunate in that the first ones encountered were of the classical or typical variety. This type was the pure sclerotic or fibrous variety of median bar, and the one which is probably meant when most of us speak of median bar formation. But as time went on and more specimens were encountered I found that I had to modify, and still further modify, my conception of what a median bar was, until, as I address you to-day, I use the term in a very broad sense, meaning thereby, obstructions involving the posterior vesical lip, unassociated with changes of an obstructive character elsewhere in the prostate, bladder, or posterior urethra.

Very early in the work I was confronted by a second type of obstructive change that was definitely glandular in character and an hypertrophy. This immediately divided the bars into two varieties, the fibrous on the extreme one hand, and the glandular on the extreme other hand. As the material accumulated borderline cases arose, midway between these two extremes, where, often with the specimen in your hand, you could not tell whether you were dealing

with the fibrous variety, or the glandular. These cases demanded microscopic study and such was undertaken. The latter has proven to a certain extent the correctness of the deductions drawn from the gross macroscopic study alone, and has likewise shown that there are borderline cases where sclerosis and glandular hypertrophy are mixed, and hence we cannot be too exacting in nomenclature and classification. For this reason I have held to a classification based on the gross pathologic changes, rather than on the microscopic, as from a clinical viewpoint it is the better working basis. Moreover, I have also adhered to the title "Median Bar Formation" because the work has shown that the pathology varies, and personally I am strongly in favor of retaining this title, limiting it by an adjective to designate the type of pathologic change that has caused the bar in any specific instance.

There have now been examined a total of three hundred autopsy specimens, with ages varying from eighteen to eighty-three years. Studying them by decades we find that:

From	10	to	20	years there were	4	cases
"	21	"	30	" " "	33	"
"	31	"	40	" " "	58	"
"	41	"	50	" " "	75	"
"	51	"	60	" " "	57	"
"	61	"	70	" " "	48	"
"	71	"	80	" " "	15	"
"	81	"	90	" " "	2	"
and the age unknown in					8	"
Total					300	cases

These three hundred autopsy examinations have uncovered fifty-four cases of obstruction at the posterior vesical lip, that is, specimens of median bar formation, under the definition given above. Eighteen

per cent of the total number of specimens examined showed obstruction of this type.

Of the fifty-four median bar cases eighteen specimens are recorded as large, by which I mean that there is no doubt that the condition as found must have caused urinary obstruction and retention, and that the size of the bar and the visible damage to the urinary tract above stood out as a marked abnormality on examination of the specimen. They represent six per cent of the total series.

In the remaining thirty-six cases (12%), the bar is recorded as small, meaning thereby that though the abnormality was unmistakable on examination, the condition was not of so pronounced a degree, nor was it associated with other changes, that would make me feel positive that urinary obstruction of importance had yet occurred. They are simply the early cases, where development had not reached such a degree as in the previous group. In these the ages are recorded as from twenty-six to seventy-four years.

The average age for the cases classified as large bars is 58.4 years, and for the small bars 46.3 years, a difference in figures that was to be expected, but not to be considered weighty, except from the clinical and diagnostic standpoint, for with but few omissions they are all within the age when hypertrophy of the prostate may be expected to be the cause of the condition.

Realizing that a criticism of this way of approaching such a problem would be that it is devoid of any clinical information in these cases as to whether or not there really was any urinary obstruction present before death, I have taken particular pains in each and every case to find evidence of back pressure in the bladder, the ureters, or kidneys. In the majority of cases this has been so self-evident as to demand explanation rather than inquiry. The presence of

beginning muscular hypertrophy and trabeculation of the bladder wall, the presence of a bas-fond, diverticula formation, or the thin-walled, dilated bladder, are all indicative of retention and back pressure; ureteral dilatation, varying grades of hydronephrosis, and changes in the renal parenchyma, have been the earmarks that have helped to label these gross pathologic changes as having been obstructive during life. As an actual matter of fact, these and only these are ofttimes the stigmata which we use clinically to diagnose bar cases, and we really only lack as missing factors from our symptom complex the demonstration of the presence of residual urine, and the rather unreliable symptom of urinary frequency or difficulty.

Each of the two varieties of bars — the fibrous and the glandular — have had to be divided into two subdivisions, or sub-varieties, making four types in all, viz.:

First — A type of abrupt bar or dam, rising from, or better, stretched across, the posterior lip of the vesical orifice, formed of firm, dense, sclerotic tissue, whose edge is sharp and narrow, and whose lateral terminations form an abrupt angle with the lateral walls of the vesical outlet. It occurs as an abrupt rise to the normal level course of the posterior urethra, and one finds that the distance from the vesical orifice to the verumontanum — the so-called urethral trigone — has been markedly foreshortened, and in typical cases the verumontanum is drawn up directly under the abrupt rise that forms the median bar. (Figs. 2, 4.)

On cross section the distance from the vesical lip to the perivesical tissue posteriorly is considerably increased, as is also that from the same surface to the mass of tissue that forms the posterior prostatic commissure. This distance is formed of a striated fibrous tissue of dull white color, devoid of apparent gland elements, and with fibres running parallel to its

surfaces to meet at the bar's free edge. It gives one the impression of being pinched up, or drawn together, rather than that of proliferative outgrowth. (Fig. 3.)

Microscopic: The study of sections of this type of fibrous bar have shown different degrees of an inflammatory sclerosis. In the early cases the inflammatory reaction is limited to islets of round cell infiltration under the mucous membrane and at scattered foci, ofttimes perivascular, deeper in the muscular tissue. This early stage is followed by a gradual connective tissue proliferation crowding between the muscle bundles advancing as the muscular tissue decreases, and associated with more or less generalized round cell proliferation throughout all layers and depths. Several sections have been cut of fibrous bars which apparently showed no inflammatory reaction, no round cell infiltration, et cetera, but just a marked connective tissue proliferation and muscular atrophy; it represents, I believe, an end process with the inflammatory element quiescent — a fibrosis — such as is seen elsewhere in the body after a chronic infection has run its course. In none of my sections has the inflammatory process been limited to the vesical lip region alone — I mean the sphincter muscle structure alone — but in the depth can also be found similar changes going on in and around the gland acini. At times it is a progressive sclerosis with pressure atrophy of the acini, and again in other sections it seems to be associated with hypertrophic glandular changes.

It is my firm conviction from these observations that the fibrous types of median bars are but the outward visible sign of an underlying infectious process, a chronic prostatitis, and are not the result of a limited local lesion.

Frequency: There have been four specimens of this type classified as large bars. They occurred at the

ages of fifty-eight, sixty, sixty-seven, and sixty-five years. All four had advanced chronic interstitial nephritis. The younger died in uræmia. Two had markedly trabeculated bladders, in each case associated with diverticula formation, and the fourth bilateral dilated ureters and hydronephrosis.

There were twenty-one cases classified as small bars of this type, varying in age from twenty-six to seventy-four years.[1]

Second — A type of fibrous bar whose projection has a tendency upward, or vesicalward, and seems to encroach upon, or draw upon, the vesical trigone more than upon the urethral surface. It causes a shortening of the vesical trigone by a transverse creasing or infolding of the same, and it is on this account the type more readily appreciated cystoscopically by the deep depression where the flat trigone should be, and by the proximity of the ureteral orifices to the vesical orifice. (Fig. 5.) This type has been least frequently found in this series, and likewise shows less tendency to obstructive changes. This sub-variety of fibrous bar is not essentially different from the first as to its microscopic structure; it simply seems to have expended its efforts in a different direction, and is not associated with the urethral shortening so characteristic of type No. 1, but by the aforementioned trigonal change.[2] There have been five specimens of bars of this type; three classified as large, occuring at the ages of fifty-

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[1] The large number of specimens here classified as small fibrous bars is hardly a fair proportion to draw deductions from, for some are here because early in the work I had no classification, and close descriptions of the specimens are absent; and secondly, I feel sure that were each and every one sectioned and studied microscopically, they would be found (as some have been) to belong in other types. Judging them grossly I have no other alternative than to place them here and draw attention to the fact. A. R.

[2] One specimen appears in the gross to be mixed, *i.e.*, has the characteristics of this type of fibrous bar and also the rotundity of a glandular hypertrophy. It has not been sectioned.

five, sixty-five, and seventy-nine years. All were associated with chronic kidney and bladder changes, and the youngest with a dilated right ureter. The two classified as small occurred at the ages of forty-three and forty-four years.

Third — This is a type of glandular bar where the hypertrophic process is confined to the gland acini of the posterior prostatic commissure, inside the prostatic capsule and under the sphincter muscle. It raises the posterior vesical lip into a thick, broad, heavy obstructing bar. I believe that this is often the most prominent feature of a beginning general hypertrophy, and is also the early cause of obstruction to the emptying of the bladder. However, it is frequently unassociated with visible hypertrophic changes — grossly — in the lateral lobes, or even if so associated it undoubtedly gives rise to obstructive manifestations long before a correlative amount of hypertrophy in the lateral lobes assumes any importance at all. (Fig. 6.)

On section in the mid-line of one of these bars there is found a covering layer from six to eight mm. in thickness of uniform fibrous and muscular tissue. This is more than occurs in a perfectly normal vesical lip, but not comparable with the true fibrous bars. Below this is seen distinctly a circumscribed area of glandular tissue, in some cases 2 cm. in diameter. This appears whiter, with the typical translucent mottling and spheroid appearance of hypertrophic prostatic tissue. (Fig. 7.)

Microscopic: This type of bar has been very easy to demonstrate microscopically and in all specimens the typical picture of prostatic hypertrophy was found. There was likewise found a simultaneous association of inflammatory sclerosis with the hypertrophy in all the cases studied microscopically of this type of bar formation.

Frequency: There were ten cases in all put in this classification. This is 3.3 per cent of the total series of autopsies. There were four cases classified as large bars, occurring at the ages of forty-six, fifty, fifty-two and fifty-six years. In two it must be granted that there was a slight degree of lateral lobe hypertrophy, but in nowise correlative to the size of the large glandular bar and certainly playing no part in the bladder obstruction.

There were six cases classified as small bars of this type, occurring at the ages of twenty-six, forty, fifty-three, fifty, fifty-five, and sixty-three years.

Fourth — The type of glandular obstruction — call it a bar if you will — caused by the isolated hypertrophy of Albarran's sub-cervical glands. These hypertrophies have proven to be quite frequent and rarely develop as a definite bar, but rapidly assume the shape of a perfectly rounded lobe with deep lateral cleftings. Several beautiful specimens of such isolated hypertrophies have been encountered in the series, varying from a small lobular mass or nodule lying in the internal sphincter's grasp, up to that of a large intravesical lobe, and it has been a matter of difficulty to decide whether to group them with the bar cases where clinically they belong (when small), or under prostatic hypertrophy, which anatomically they are. The small hypertrophies (ofttimes the most obstructive) can be dealt with surgically as though they were bars, while the large lobes demand procedures similar to prostatectomy, and it is left to each one's opinion in each individual case where the dividing line is to be drawn. (Figs. 8, 9.)

On section, one sees just immediately under the mucous membrane glandular tissue of varying size according to the gross enlargement present.

Microscopic: On sections of such a lobule one sees under the microscope a proliferation of gland acini a

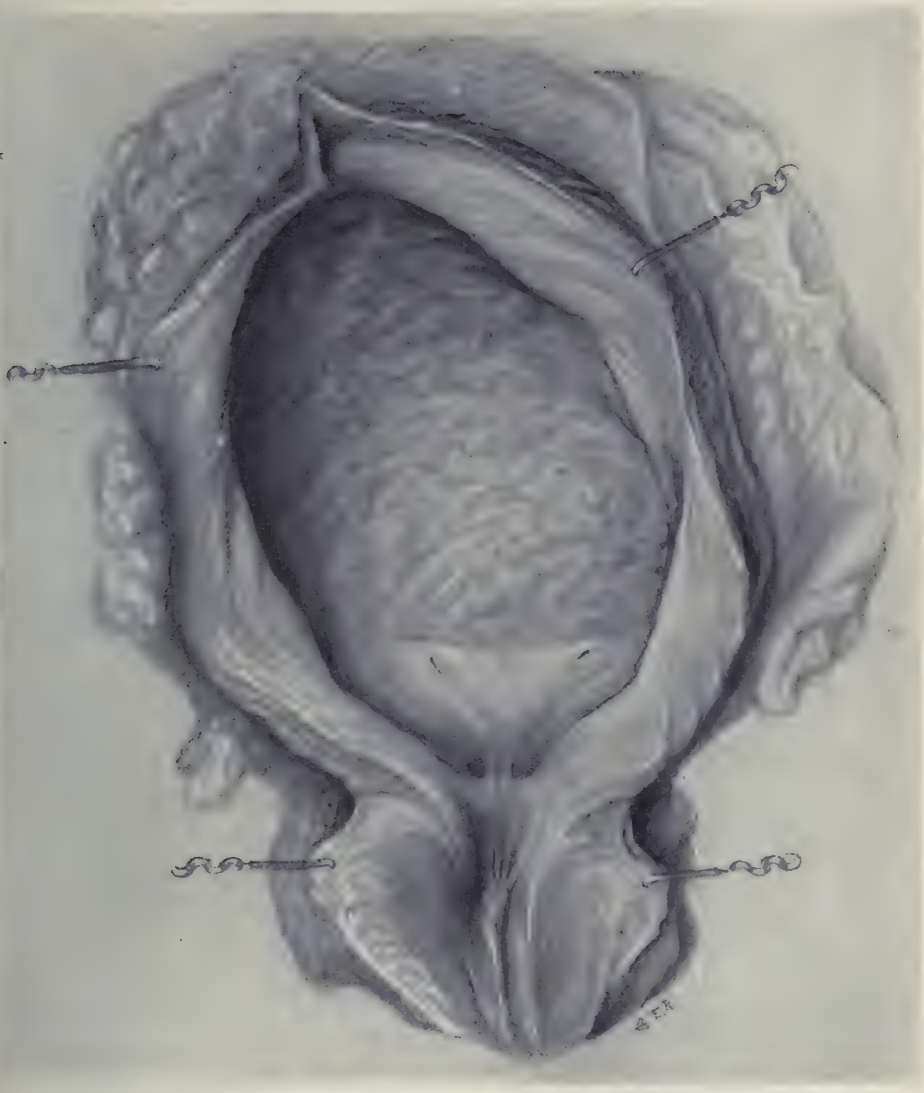

Fig. 1.

Specimen No. 3927. Shows the normal bladder cavity, trigone, vesical orifice, urethra, and prostate of a male, dying at the age of forty-two years, as viewed when opened along the ventral or anterior surface. Note size and relative positions of ureteral orifices, trigone, uvula vesicæ, urethral trigone, verumontanum, and size of prostate. The proportions are drawn to the scale of life size, to which all the following illustrations may be compared, as the same scale has been maintained throughout.

Fig. 2.

Median bar; fibrous; Type 1. Specimen No. 3850. F. H., aged sixty-seven years. Entered the Men's Medical Ward on December 21, 1915. Profoundly toxic, catheterization necessary, urinary output small. Died December 27, 1915. Clinical diagnosis: Lobar pneumonia, chronic myocarditis, chronic nephritis. Anatomical diagnosis: Lobar pneumonia, pleurisy, chronic interstitial nephritis, hypertrophy, and dilatation of heart. Specimen shows good bar formation; urethral trigone very much shortened with verumontanum drawn up close under the breast of the median bar. Vesical trigone and prostate normal in outline and size. Note the abrupt angle to the normal course of the urethra where the bar occurs. There was likewise a diverticulum in the vertex of the bladder not shown in this illustration.

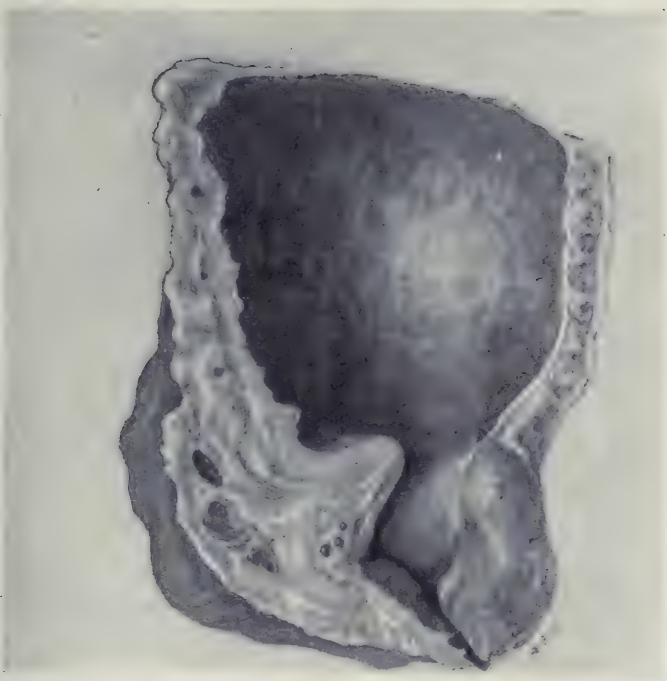

Fig. 3.

Median bar; fibrous; Type 1. Specimen No. 3850. Same as Fig. 2, drawn after sagittal section of the specimen, giving in clear detail the position of the bar, character of tissue, location of verumontanum, and abrupt angle to the normal urethral course.

Fig. 4.

Median bar; fibrous; Type 1. Specimen No. 3871. M. G., aged sixty. Entered Medical Ward, January 14, 1916, suffering with an acute attack of influenza. Died January 20, 1916. Clinical diagnosis: Lobular pneumonia. Anatomical diagnosis: Lobular pneumonia, pleurisy, parenchymatous nephritis, early interstitial nephritis. Specimen shows a thick, short bar, with marked shortening of the urethral trigone, verumontanum being drawn up directly under the base of the median bar formation. Prostate of normal size, vesical trigone of the Y-shaped variety. Evidence of urinary obstruction seen in the formation of the small diverticulum in the vertex of the bladder.

Fig. 5.

Median bar; fibrous; Type 2. Specimen No. 3834. C. T., aged seventy-six. Entered the hospital July 17, 1914. History highly suggestive of carcinoma of the œsophagus, and after a protracted confinement the patient died December 10, 1915. Clinical diagnosis: Carcinoma of the œsophagus, chronic myocarditis, arteriosclerosis. Anatomical diagnosis: Carcinoma of the œsophagus, stomach, and liver; chronic diffuse nephritis. Specimen a good illustration of bar formation and of the second type which is characterized by encroachment on the vesical trigone, with shortening and transverse creasing of it, rather than on the urethral surface. There is a well-marked bas-fond and beginning trabeculation and thinning in the bladder walls. No prostatic enlargement.

Fig. 6.

Median bar; glandular; Type 3. Specimen No. 4123. G. F. H., aged fifty-six. Entered the Men's Medical Ward, May 17, 1916, complaining of shortness of breath and general cardiac symptoms of eighteen months' duration. History of a specific urethritis in youth. Physical examination reveals general symptoms of broken compensation and Cheyne-Stokes respiration. History notes urinary output as small, urine examination shows low specific gravity, trace of albumin, and a few hyaline casts. Patient died October 1, 1916. Clinical diagnosis: Myocarditis, decompensation, chronic interstitial nephritis. Anatomical diagnosis: General anasarca, dilatation of heart, chronic fibroid myocarditis, multiple pulmonary infarcts, chronic diffuse nephritis. The specimen is one of glandular bar formation due to hypertrophic glandular changes in the posterior prostatic commissure. The bar is thick, rounded, and firm. The bar has an upward tendency of growth causing, as is characteristic of Type 2, a transverse creasing of the vesical trigone: however, grossly, it in nowise resembles a fibrous type of bar. The lateral prostatic lobes are slightly enlarged. the bladder wall decidedly hypertrophied.

Fig. 7.

Median bar; glandular; Type 3. Specimen No. 4071. W. I. L., aged twenty-six. Entered the Medical Ward July 14, 1916, with acute pulmonary symptoms. He gave a history of having had a Neisserian infection fifteen years ago. There are no genito-urinary symptoms recorded on the history. He died a typical pulmonary death July 16, 1916. Clinical diagnosis: lobar pneumonia. Anatomical diagnosis: lobar pneumonia, cloudy swelling of kidneys. The specimen shows a small bladder with thick (hypertrophied) walls. There is a definite bar at the vesical orifice of the thick glandular type. The hypertrophy of the bladder musculature has been in an effort to overcome the beginning obstruction, and helped by youth the compensation has apparently been complete to the time of death. Section of the bar in the midline demonstrated an increase in the prostatic glandular tissue of the posterior commissure, early hypertrophy at this point having been responsible for the bar formation.

Fig. 8.

Median bar; glandular; Type 4. Specimen No. 3963. G. S., aged fifty. Entered the Insane Wards, February 2, 1916. He had been picked up on the street by the police, gave evidences of having lived a tramp's life, could give no coherent statement as to his past and lacked any knowledge of the present. His history notes general lessening of mental faculties, restlessness, senility, and dementia. He is incontinent. Wassermann is negative. Died March 30, 1916. Clinical diagnosis: Senile dementia, arteriosclerosis, dry gangrene of right foot. Anatomical diagnosis: Broncho-pneumonia, chronic interstitial nephritis, obliterative arteritis of right posterior tibial artery. Specimen shows a small nodular hypertrophy at the vesical orifice. Behind this is a highly trabeculated bladder wall giving all the necessary evidence of having worked against a gradually increasing degree of obstruction. This nodular hypertrophy is situated just under the mucous membrane, is not associated with any hypertrophy of the prostatic lobes, nor was there any stricture of the urethra present. This type of obstruction is due to an isolated hypertrophy of the subcervical group of glands of Albarran.

Fig. 9.

Median bar; glandular; Type 4. Specimen No. 3967. A. B., aged sixty-seven. Entered the Medical Ward, March 20, 1916, complaining of abdominal pain, dizziness, and paralysis of right leg. Patient found to be very weak, pain in abdomen of five days' duration and of shooting character. Inability to use right leg of four days' duration and gradually increasing in its extent. No venereal history. Patient very emaciated, semicomatose, incontinence of urine and fæces. Heart sounds weak, chest negative, abdomen rigid, but with no localizing tenderness. He became progressively weaker and right-sided hemiplegia developed, and he died March 31, 1916. Clinical diagnosis: Cerebral thrombosis. Anatomical diagnosis: Broncho-pneumonia, chronic fibrous pleurisy, chronic interstitial myocarditis, chronic valvulitis, arteriosclerosis, chronic interstitial nephritis. Specimen shows a lobular median obstruction with deep lateral cleftings. It is superficial and covered only by the mucous membrane. Bas-fond well developed, bladder walls hypertrophied, prostate normal in size. Like the two preceding specimens it represents an isolated hypertrophy of the subcervical glands of Albarran.

little atypical from benign prostatic hypertrophy in that there seems to be more of a glandular hyperplasia — an actual increase in the number of gland tubules — than a glandular hypertrophy with the typical finger-like intra-acinous projections that is found in the hypertrophic lateral lobes. This hypertrophy lies directly under the mucous membrane, and in my sections is again associated with inflammatory manifestations.

Frequency: The enlarged median lobe has been without doubt the most frequent obstructive growth found in this series. However, I have only included here those that were absolutely devoid of any hypertrophic changes in the lateral lobes and also only those where the growth could be considered of size compatable with operative procedures now in vogue for the cure of median bar formation.

Fourteen specimens have fallen into this group. Seven, or 2.3 per cent, were recorded as large and definitely obstructive. They occurred at the ages of thirty-six, forty-eight, forty-nine, fifty-six, sixty-seven, seventy-one, and seventy-three years. The ones classified as small are recorded as of forty-three, forty-seven, fifty-one, fifty-four, fifty-six, sixty-two, and sixty-four years.

Summary. (1) There have been examined three-hundred autopsy specimens in the adult male. They have shown median obstruction to the vesical outlet in eighteen per cent, or fifty-four cases. These have been shown to be either (*a*) fibrous, ten per cent, or (*b*) glandular, eight per cent.

(2) The fibrous type of bar has been subdivided into two varieties according to whether the process has encroached upon, or drawn up, (*a*) the urethral, or (*b*) the vesical surface in its development. In the former group occur 83.3 per cent (see footnote, page 110), in the latter 16.6 per cent. They have been shown

to be inflammatory in character and to be but a part of a generalized chronic interstitial prostatitis.

(3) The glandular type has also been subdivided into two varieties according to whether the hypertrophic process is confined to (*c*) the posterior prostatic commissure, inside the prostatic capsule and under the sphincter muscle, in which case a thick, broad bar is formed; or (*d*) the subcervical glands of Albarran, occurring just under the mucous membrane and within the sphincteric ring, and forming what Zuckerkandl has so aptly called "prostatic hypertrophy in miniature," *i.e.* a small obstructing lobule. (Fig. 8.)

(4) The vast majority of even the glandular types of bars also have been associated microscopically with inflammatory connective tissue proliferation and tending to fibrosis.

(5) Age has not been a differentiating point in any series or type. The youngest of the cases classified as large bars of the fibrous type was fifty-five years of age and the oldest seventy-nine years. In the glandular types the youngest was forty-six years old and the oldest seventy-three years, though there were three under fifty years.

(6) Microscopic study has demonstrated a comcomitant infectious process in all cases of true median bar formation, and has pointed to a chronic prostatitis as the actual underlying cause.

THE SYMPTOMATOLOGY, PATHOLOGY, AND TREATMENT OF MEDIAN BAR OBSTRUCTION.

With an Analysis of One Hundred and Fifty-six Punch Operations.

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Four years ago one of us reported one hundred cases of median bar obstruction at the prostatic orifice, in which the punch operation had been carried out, and as the procedure is still somewhat novel and has not been widely adopted, the time seems opportune to present again this subject with a careful analysis of the ultimate results obtained in the cases previously reported, and a further study of those which have been operated on since the first report was made. In the last two years the subject has been enriched by a splendid historical and pathological study by Randall,[1] anatomical articles by O. S. Lowsley,[2] and by clinical articles by A. B. Cecil,[3] Granville Macgowan,[4] and Lowsley,[5] the latter followed by excellent discussion.

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[1] Prostatisme sans Prostate. *N. Y. Med. Jr.*, Dec. 4 and 11, 1915.

[2] The Prostate in Old Age. *Annals of Surgery*, Vol. XXXVII, No. 8. The Human Prostate Gland in Youth. *Med. Record*, Sept. 4, '15.

[3] Contracture of the Vesical Neck. Diagnosis and Treatment. *Calif. Jour. of Med.*, Aug., 1916.

[4] Intra-urethral Operations. *Jour. A. M. A.*, LXV, p. 989.

[5] Observations on Certain Obstructions at the Vesical Orifice. *Jour. A. M. A.*, LXVIII, p. 444.

Before beginning our clinical study it seems wise to refer briefly to our early work on this subject, and we shall therefore quote as follows from a paper which appeared in the Journal of the American Medical Association, Jan. 25, 1913.[6] Previous to this, a report of twenty cases had been made by Young in a paper on the Ultimate Results of Prostatectomy, before the Medical Congress in London in 1911.

"January 27, 1909, I saw a patient in whom rectal examination showed a prostate no larger than normal, yet a catheter withdrew 500 c.c. residual urine, and the cystoscope showed a small but definite transverse median bar. The patient objected to a prostatectomy, and I removed the median portion of the prostate through a suprapubic incision. The prostatic orifice was found to be surrounded by an inelastic ring, difficult to dilate, and in the median portion there was a small bar only slightly elevated above the trigone. With forceps and scissors this was excised, the vesical orifice dilated widely, and apparently all obstruction had been removed. The patient remained in the hospital eight weeks before the suprapubic fistula healed, and a month later showed evidences of recurrence of the obstruction. In the course of three months the suprapubic wound had reopened, obstruction of the prostatic orifice being almost complete, and in a short time the patient died of uræmia.

"A study of this case brought forcibly to my attention the fact that it should be possible to treat such cases by means of excision of the median portion of the prostate through the urethra, and I therefore set about to construct an instrument by means of which this could be done. Fig. 1 shows the final

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[6] Young, H. H. A New Procedure (Punch Operation) for Small Prostatic Bars and Contracture of the Prostatic Orifice. *Jour. A. M. A.*, 1913, LX, 253.

outcome of my experimentation. It consists of an outer tube about 18 cm. long with a coudé curve at its inner end, and a urethroscopic disk at the other, containing a post on which an external urethroscopic light can be attached. Near the inner end of the under surface a large deep fenestra is provided (Fig. 1). Within the instrument is a second tube which has a sharp-cutting inner end made of steel, which when pushed home can excise anything appearing inside of the outer tube. The object of this instrument is, when pushed through the urethra into the bladder, to engage the median bar in the fenestra and then to excise it by means of the inner cutting tube while observing the operation through the inner tube illumined with the external urethroscopic lamp.

"The first operation was performed with this instrument on Feb. 1, 1909, in my office, under cocain anæsthesia. A piece of tissue about 7 mm. in diameter and 1.3 cm. long was excised almost without pain, with little subsequent hemorrhage and splendid functional result, in a case of small median bar obstruction of long duration. Since then I have operated on numerous cases, and am now able to report one-hundred cases of obstruction to urination of the median bar type, and others with peculiar small enlargements of the lateral or anterior portion of the prostate, which have been operated on with this instrument.

"Before detailing these cases it may be well to speak more definitely in regard to the technique of the operation as now performed.

"The instrument is usually inserted with the cutting obturator pushed home until the end of the instrument is felt to enter the vesical orifice. The inner tube is then withdrawn about 2 cm., the electric light attached externally, and an inspection made. As a rule, the verumontanum will be seen bulging

into the fenestra. The instrument is then pushed slowly inward, the verumontanum is seen to disappear, and the median portion of the prostate gradually enters and finally fills the fenestra completely. If the instrument is pushed a little farther inward, urine escapes, showing that the instrument is in the bladder. When it is drawn outward the flow of urine ceases, showing that the inner edge of the fenestra is caught against the median bar, a good view of which is easily obtained after aspirating the fluid from the interior and drying with swabs. The inner cutting tube is then rapidly pushed home, and excises in one piece the tissues caught in the fenestra (Fig. 4). With alligator or rongeur forceps, inserted into the instrument, this piece of tissue is removed (Fig. 7), and is usually 1.2 to 1.5 cm. long, one-third of its circumference being covered with mucous membrane, partly vesical and partly urethral. Experience has shown that one cut is usually not sufficient, and that it is wise to next turn the instrument first to the right and then to the left, in order to remove more of the median bar on each side. The lateral cuts never excise as much as the posterior median, generally about one-third as much. The cutting inner tube is then removed, the bladder is washed out through the outer tube, and when apparently clear of clots the obturator is introduced and the instrument withdrawn. Immediately afterward a two-way urethral rubber or gum catheter is inserted into the bladder (by means of a stilet if a gum catheter is used) and continuous irrigation at once begun."

During the past three years the instrument has been improved and the operation simplified. A new non-rusting steel of high tensile strength has been found and the instrument largely constructed of this material, this furnishing much better execution in excision of the portion of the prostate which is

entrapped in the fenestra. Secondly, it has been found perfectly feasible to carry out the operation accurately without the use of the urethroscopic attachment. The instrument is passed into the bladder, and the cutting inner tube withdrawn, allowing water to escape and showing that the fenestra is in the bladder. Then it is drawn outward until the bar is caught in the fenestra. When the median bar is entrapped one can be sure that the trigone has not been caught by simply turning the instrument 90 degrees to one side and making traction; this would at once disengage the trigone. The instrument is then turned again posteriorly to remove the median bar, and the lateral cuts to remove the remaining portions of the median bar are then made on each side. Further experience has shown the considerable frequency of anterior valves or rounded bars. This condition, which has not previously been described, is, we believe, responsible for many cases of obstruction, and also for some failures of the punch operation in which this portion of the obstructive prostate was not removed.

The operation as now carried out is graphically shown in the accompanying illustrations (Figs. 2 to 9, inclusive). First the urethra is anæsthetized with 4% novocaine or 2% cocaine. A catheter is then passed and the fluid allowed to escape. Then the bladder is filled with as much sterile water as the patient can hold without discomfort and the catheter withdrawn. The punch instrument is then passed well into the bladder with the knife in such a position as to completely fill the fenestra. The knife is then withdrawn, allowing the fluid to escape, and thus showing that the fenestra is in the bladder. The instrument is then rotated so that the fenestra is directed properly for the first cut, and the instrument slowly drawn outward until suddenly arrested and till the escaping fluid is completely stopped, showing the fenestra has

entrapped that portion of the margin selected for excision. If the instrument is directed posteriorly it should now be rotated 90 degrees and traction made, to be sure the tissue engaged is not the trigone. If no fluid now escapes it is evident that the bar has been caught and the instrument is turned back to its original position and the knife pushed home, incising all the tissue lying in the fenestra. This manœuver is very important, for if the trigone has been caught, by turning the instrument 90 degrees it will be released and the fluid will escape. The tissue, after each cut is made, is removed by means of a long pair of alligator forceps.

The two-way catheter is no longer used because a single, fairly large coudé gum catheter has been found more satisfactory, as clots are more easily removed by suction with a large syringe. The continuous irrigation has been found to lead to more hemorrhage, and during the past year, since the introduction of the kephalin-coated catheter by one of us (Cecil), hemorrhage usually ceases very promptly after the insertion of the catheter, and does in fact give us very little trouble. A No. 26 or 27-F, kephalin-coated catheter is generally the most satisfactory size to use. In the after-treatment it is extremely important that a good piston syringe is at hand for prompt evacuation of all clots, and not infrequently this is necessary several times during the first twenty-four hours following the operation, but with great care, no difficulty should be experienced, and we have never had to perform suprapubic drainage after a punch operation, as has been reported by others. The catheter is allowed to remain from thirty-six to forty-eight hours, after which it is removed and usually no subsequent catheterization is necessary, even in cases that have had complete retention of urine. No form of urethral dilatation is necessary because recontraction of the internal

orifice does not occur. Occasionally, however, slight stricture of the anterior urethra has required sounding and dilatation.

Ætiology. After making a careful study of our cases with regard to etiology, it is almost impossible to draw any definite conclusions. The following table will give, in order of frequency, what seems to be the most probable cause:

Number of patients who had had gonorrhœa	43
Number of patients who had cystitis at time of cystoscopy	44
Localized cystitis	4
Vesical calculus	18
Present since childhood	11
Sexual excess	6

The condition has been found in twenty-four cases after prostatectomy, twenty of them being perineal and four suprapubic. The condition following prostatectomy is usually a contracture of the vesical orifice or a posterior bar, which will be described later, but there may be a very small spheroid mass resembling a hypertrophy of Albarran's or Home's glands. This mass may, however, be situated in any position instead of posterior. There were eighty-four cases that gave history of none of the etiological factors above mentioned.

In considering the forty-three cases that had gonorrhœa previously, it is easily conceivable that an acute inflammation of the glandular structures situated at the vesical orifice, or an inflammation situated just beneath the mucous membrane in the same place, might cause the formation of a bar.

Forty-four cases had cystitis at time of cystoscopy. There can be but little doubt that a disease which is capable of causing a marked contraction of the bladder with great thickening of its walls is also capable of causing an increase of tissue at its outlet and in this way leading to obstruction. But one must consider

that in a large proportion of these cases the cystitis may be the result of median bar rather than a cause, and there is no precise way of deciding just which is cause or which is effect. So, too, we have to consider vesical calculi: in one instance the constant irritation produced by this foreign body may be the cause; in another the residual urine with infection is equally apt to lead to calculus formation.

When one surmises that masturbation, sexual excess, sexual excitement without gratification, withdrawal, etc., are causes of chronic prostatitis, it is possible that this in turn may lead to the formation of median bars. The following table, by decades, will give an idea at what period in life the condition is most frequent:

Before 20 years	1 case
20 to 29 "	5 cases
30 " 39 "	11 "
40 " 49 "	39 "
50 " 59 "	41 "
60 " 69 "	37 "
70 " 79 "	19 "
Over 80 "	3 "

Pathology. In considering the pathology of median bar formation, contracture of the vesical orifice (muscular or otherwise), a glandular hypertrophy of the Albarran or Home groups, a transverse bar or dam situated on the posterior portion of the orifice, as well as transverse anterior folds or dams, are all included under this general term.

The gross picture of these conditions, though in some respects similar, differs markedly in others. The orifice is different in appearance from the normal when viewed from the vesical side, in that it is perfectly round instead of being slightly flattened posteriorly, or semilunar (Figs. 10 and 11). The slight elevation which encircles it, and which represents the internal

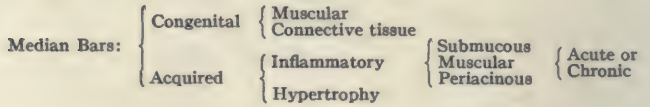
sphincter, is usually absent. On palpating the orifice it is found to be very much smaller than normal, and the tissues encircling it are resistant and non-elastic. After the finger is forced through there will often appear to be an enlargement of the urethra just beyond. The prostate has been found to be either normal, or larger or smaller than usual.

The typical median bar is a small elevation of the median portion of the prostate — the posterior part of the prostatic margin (Figs. 12, 13, 14, and 15). The trigone behind it and the urethra in front of it are apparently depressed or bent. Sometimes the trigone is also thickened and elevated to the level of the bar and continuous with it. On palpation the orifice is small and sclerotic. The prostate is usually not enlarged, generally a typical chronic prostatitis, rarely atrophied. When the glands of Home — subtrigonal — are enlarged, they form an elevation just to the vesical side of the sphincter (Figs. 16 and 17). They rarely obtain a size larger than a pea but may form a small pedunculated mass with a very small pedicle, thus acting as a ball valve. Albarran's glands lie just external to the internal sphincter (Figs. 18 and 19). When hypertrophied they tend to project into the bladder through the sphincter and are seen as a small elevation just at the orifice, deforming it in the shape of a crescent. An inflammatory process in these glands would probably form a bar as above described. The anterior bars or valves are more rare, but have been frequently met with in our series, though hitherto undescribed as far as we can find. In most cases they are thin, slightly convex, and would serve to have a valve-like action. In other cases they are fairly thick, and in rare instances form prominent rounded masses and undoubtedly obstruct.

Median bars may be divided into congenital and acquired forms. The congenital types are further

divided into those with muscular and those with connective-tissue changes. The acquired ones are divided into those with inflammatory changes, which may be either submucous, intramuscular, or periacinous, and either chronic or acute (though usually the former), and true hypertrophies of the glands of Albarran or Home. This classification has been made upon microscopic study, as it is quite impossible to tell the exact condition in the gross.

The classification is represented schematically as follows:



Though this classification takes in only the pure types, it must be remembered that by far the larger number of cases, especially the inflammatory ones, are mixed. In describing the microscopic pathology the order in the above diagram will be followed.

The muscular contractures show nothing but a great hypertrophy. Normally the internal sphincter is composed of small non-striated delicate fibres grouped into bundles separated by a thin layer of connective tissue. As the examination is carried closer to the mucous membrane the muscle structures become smaller and are separated by thicker layers of connective tissue until the submucosa is reached, where there is practically no muscle. Contrasted with this, the contractures show the sphincter to be composed of coarse muscle fibres grouped into large bundles separated by the smallest amount of connective tissue and lying much closer to the mucous membrane. (Fig. 20.) In fact, the submucosa is very thin or almost absent. This group in our series is the rarest and probably the most difficult to diagnose.

Congenital contracture due to increase in connective tissue is just the reverse of the above condition. The sphincter is composed of very delicate fibres situated in island-like groups in a thick but very compact connective tissue (Fig. 21.) The submucosa is unusually thick.

In examining the congenital group only slight variations from the normal were found, but such is not the case with the acquired. The inflammatory types will be described first. It will be remembered that these were divided into submucous, periacinous, and intramuscular. Each of these have been found in pure form but are most often mixed.

In the submucous, which is the largest group, the change is not entirely in the connective tissue. (Figs. 22 and 23.) The mucosa in some instances is either thickened and very irregular, or thin and irregular, and in places showing marked loss of epithelium. Some of the cells show poorly-staining nuclei and protoplasm, with swelling of the cell and in many a rupture of its membrane. Even in the mucosa there may be a round-celled or polymorphonuclear infiltration. Just beneath the mucosa there are large numbers of round cells, plasma cells, and newly-formed connective tissue. The blood vessels are small or large, depending upon whether there is a chronic or an acute process, and are usually surrounded by many white blood cells. The process is most active just beneath the mucosa. Here the connective tissue is very cellular, but deeper down it is composed of fibrous tissue with fewer cells. In other words, the process is a superficial one, causing a piling up of connective tissue beneath the mucosa. As the process advances the deeper layer becomes dense scar tissue which either encircles the entire orifice or causes a posterior or anterior bar.

The intramuscular type shows a diffuse round-

celled infiltration in the connective tissue, which is in great excess and in some cases dense and fibrous. The muscle is normal or affected only secondarily by compression of the ever-increasing scar tissue.

The perinacinous inflammatory changes are not different from those in the submucosa. Around the glands there is a great increase in connective tissue. (Figs. 24 and 25). The effect on the glands is varied. Many times the acini are greatly compressed and lined by a single layer of epithelium; often there is great dilation of the acini with the epithelium greatly flattened. The lumen is frequently filled with secretion, corpora amylacea, and white blood cells. The same inflammatory process may cause an enlargement by increase in connective tissue or by constricting the ducts and thus leading to a great dilatation of the acini.

True but isolated hypertrophy of these glands occurs infrequently (Fig. 26) and does not differ essentially from hypertrophy of the prostate.

The changes in the upper urinary tract are very slight and in most cases entirely absent, but in a very few the ureters are dilated with definite enlargement of the pelvis of the kidney. In one case the ureters were the size of small intestine and there was extreme bilateral hydronephrosis. On examination at the time of suprapubic cystotomy there was found a small but not fibrous orifice. The tissue was removed in the usual way with the punch instrument and the patient made an uneventful recovery and was completely relieved by the operation. On examination of the tissue it proved to be a muscle contracture.

Unfortunately some of our specimens were lost so that our pathological material comprises that of 111 of the 156 cases.

The order of frequency is as follows:

Sclerosis of internal sphincter	23
Glandular hypertrophy	20
Muscle contracture	6
Polyp at vesical orifice	6
Carcinoma of prostate with contracture	3
Cyst of vesical orifice	1
No change	2
Submucous round cell infiltration or increase in connective tissue	57
Periacinous round cell infiltration or increase in connective tissue	28

SYMPTOMATOLOGY.

The symptoms of median bar are very similar to those of prostatic hypertrophy. Except for duration the congenital and acquired are alike. These cases have slowly progressing frequency, urgency, difficulty of urination. The stream is of small size and weak force with dribbling at the end of urination. Often several attempts are necessary to empty the bladder completely. There may be marked pain or discomfort before, during, or after urination, located in the suprapubic region, perineum, bladder, or referred along the urethra.

The sexual powers are often decreased or absent. There may be pain on ejaculation which sometimes lasts for considerable time, usually located in the sacral region or in the deep urethra. Often the patients complain of constant pain in the back and perineum, which is probably referred from the inflamed prostate. Such patients, after a life of complete unrest, from impairment of sexual power and the frequent urgent desire to void, and from the difficulty and straining on urination, have their general health seriously impaired and then wander from physician to physician, being treated symptomatically for many complaints when their true condition is a chronic uræmia caused by back pressure due to a median bar, which is unrecognized as the prostate is of normal size and there is no stricture.

The duration of the disease has ranged from 1 year or less to 45 years:

Under 1 year	.....	11 cases
1–5 years	.....	50 "
6–10 "	.....	32 "
11–15 "	.....	17 "
16–20 "	.....	11 "
21–25 "	.....	2 "
26–30 "	.....	2 "
31–40 "	.....	1 "
Since childhood	.....	13 "
Not stated	.....	17 "
45 years	.....	1 case.

The urinary symptoms were as follows:

Frequency of urination	.....	108
Hesitancy " "	.....	51
Urgency " "	.....	23
Small stream	.....	40
Weak force	.....	31
Sudden stoppage	.....	15
Incomplete urination	.....	14
Retention — Complete	.....	3
Retention — Occasional complete	..	13
Incontinence	.....	1

Pain was usually associated with urination, either before, during, after, or throughout the act, and was located in the following regions:

Neck of bladder	.....	28
Perineum	.....	25
End of penis	.....	24
Throughout urethra	.....	22
Back	.....	10

The sexual symptoms were as follows:

Desire { Lost ....10 / Impaired. 22

Erections { Absent ....6 / Imperfect .11 / Painful.....1

Ejaculations { Precocious. 8 / Absent ...7 / Painful ...5

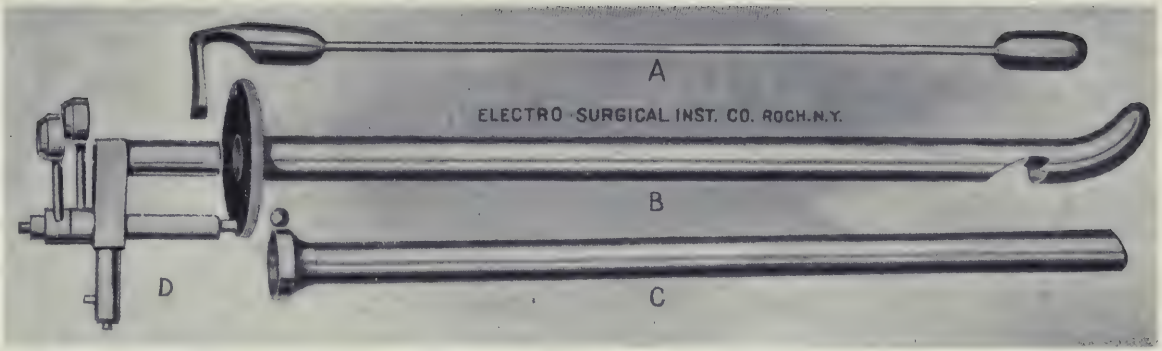


Fig. 1.

The urethroscopic median bar excisor, showing the outer tube with the fenestra *B* and the external light carried *D*, obturator *A*, and inner cutting tube *C*.

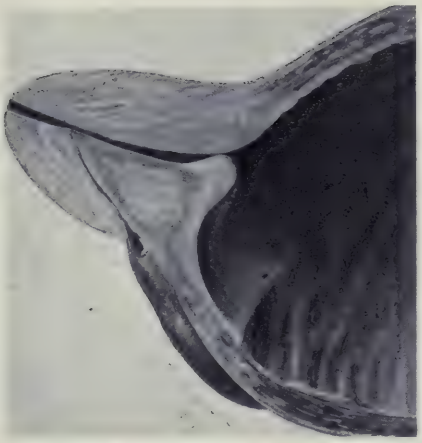


Fig. 2.

Sagittal section showing median bar before insertion of instrument, the bladder having been moderately distended with water.

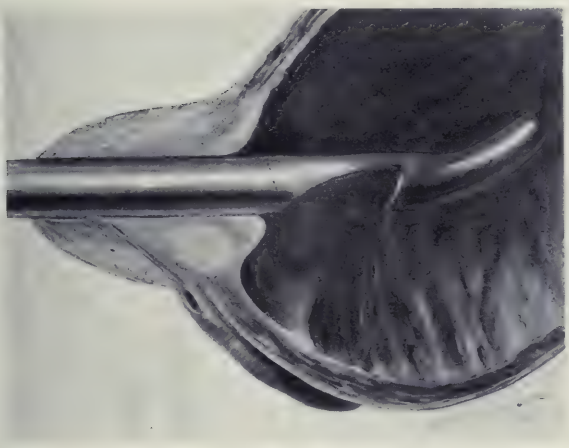


Fig. 3.

The punch instrument has been inserted and the inner tube withdrawn far enough to permit the fluid to begin to flow out.

Fig. 4.

The outer tube has been withdrawn far enough to entrap the median bar in the fenestra, as indicated by a checking in the flow of fluid. The hands of the operator are shown ready to push the inner tube home.

Fig. 5.

Shows the inner tube beginning to cut through the median bar.

Fig. 6.

The inner cutting tube has been pushed home, inclosing within its lumen the incised portion of median bar.

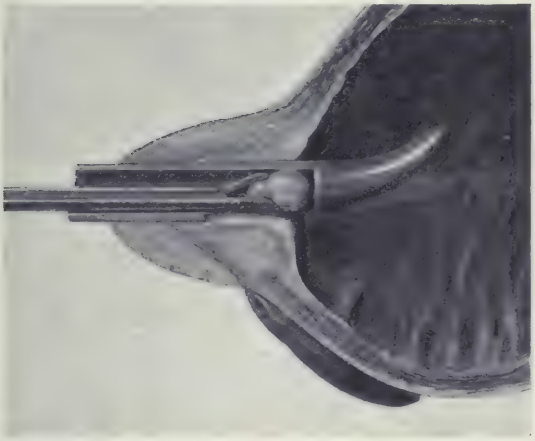


Fig. 7.

Sectional view of outer tube, showing removal of excised tissue with alligator forceps, the cutting tube having been withdrawn after the first cut.

Fig. 8.
Sagittal section of bladder and prostate after excision of median bar.

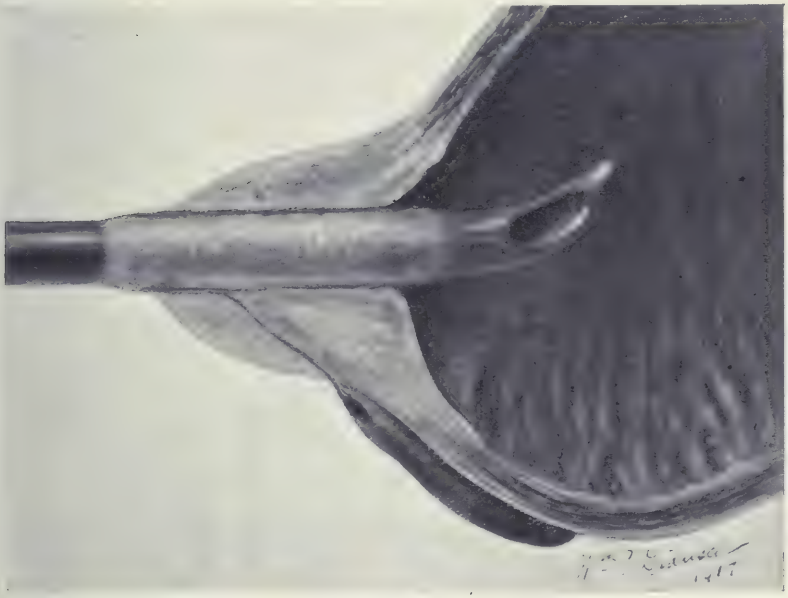


Fig. 9.
Kephalin-coated coudé catheter inserted immediately after operation and allowed to remain 36 to 48 hours.

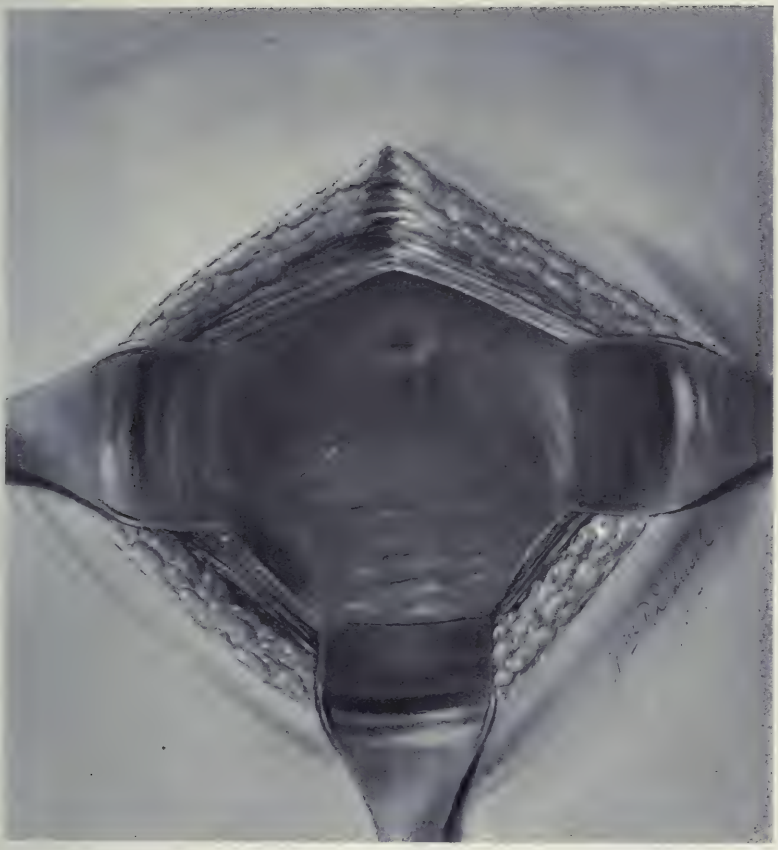


Fig. 10.
Normal vesical orifice.

Fig. 11.
Contracture of vescial orifice.

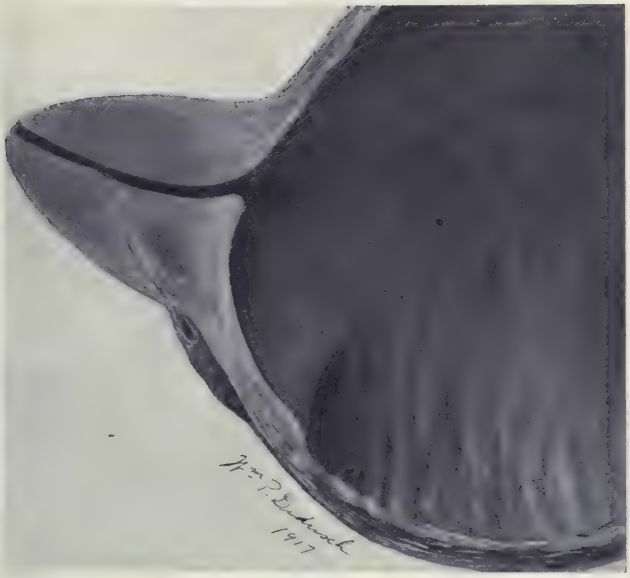


Fig. 12.
Lateral view of median bar.

Fig. 13.
Median bar.

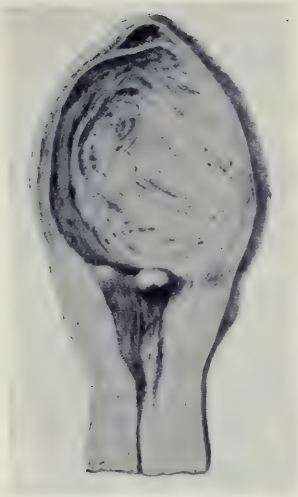


Fig. 14.
Large median bar. (From Home.)

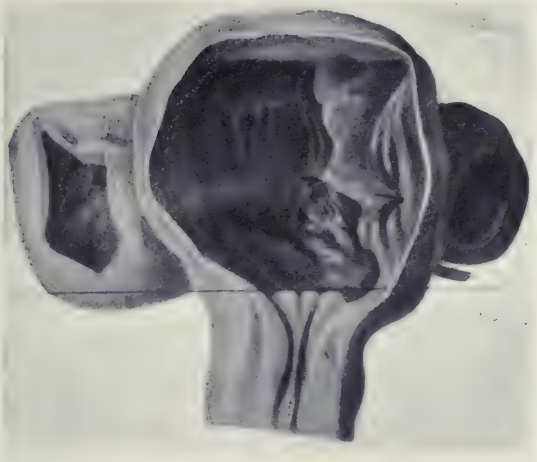


Fig. 15.
Median bar with diverticula of bladder. (From Guthrie.)

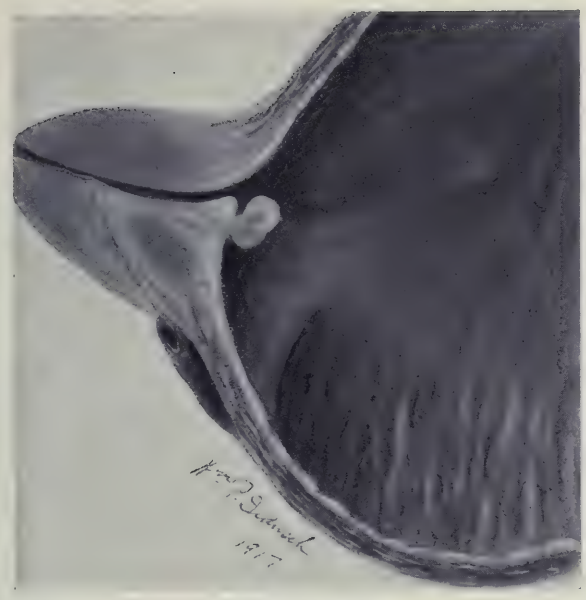


Fig. 16.

Lateral view of median bar and pedunculated hypertrophy of Home's glands.

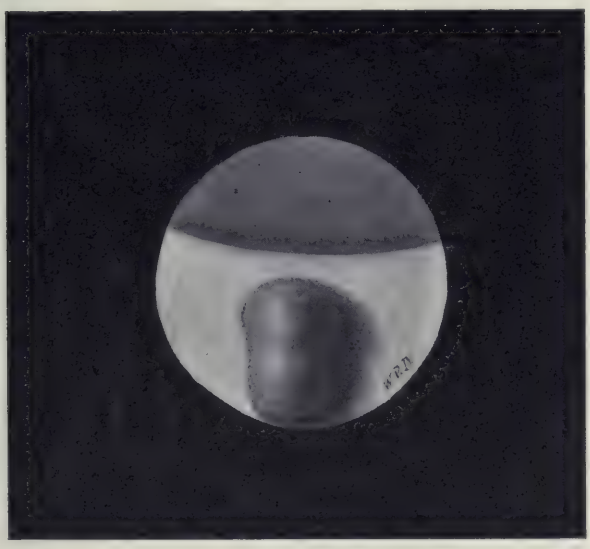


Fig. 17.

Cystoscopic view of enlargement of Home's glands.

Fig. 18.
Hypertrophy of Albarran's glands.

Fig. 19.
Slight enlargement of Albarran's glands. (From Home.)

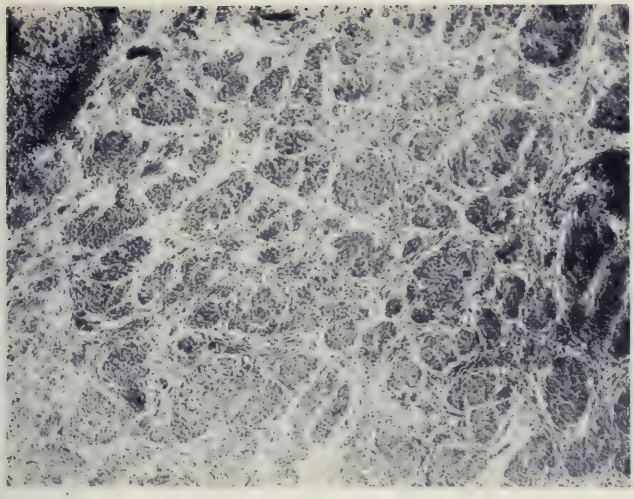


Fig. 20.
Muscle hypertrophy.

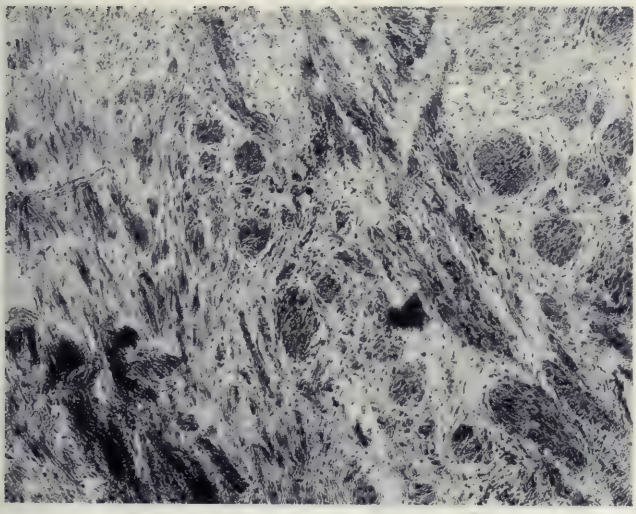


Fig. 21.
Sclerosis of internal sphincter.

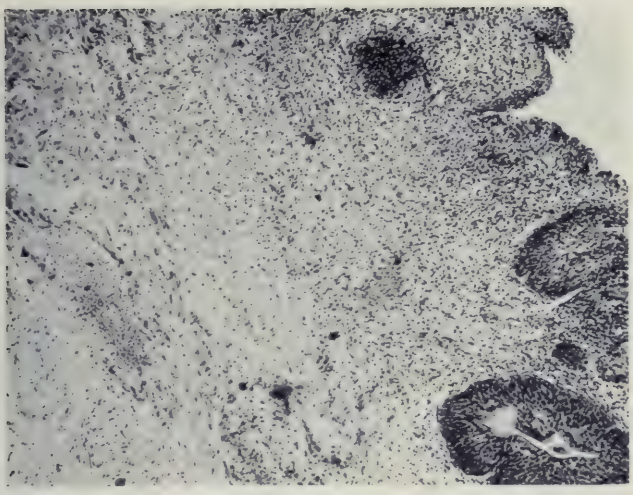


Fig. 22.
Chronic submucous inflammation.

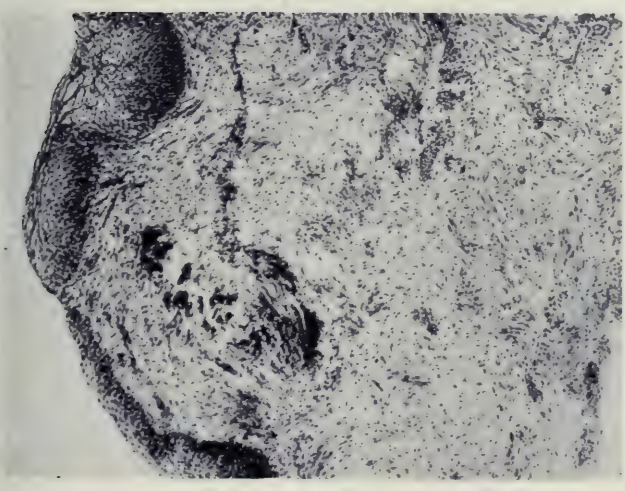


Fig. 23.
Contracture due to submucous scar tissue.

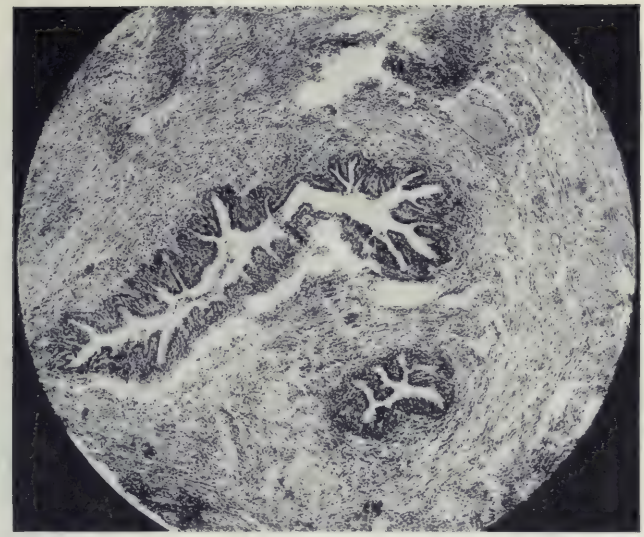


Fig. 24.
Periacinous round cell infiltration.

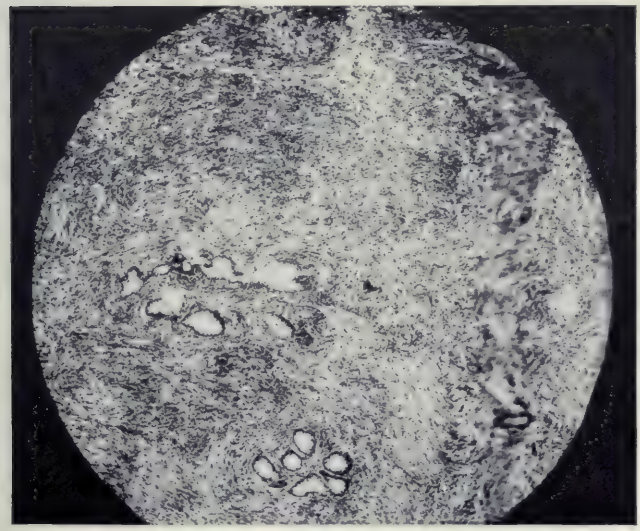


Fig. 25.
Interacinous increase in connective tissue. Chr. inflammatory change.

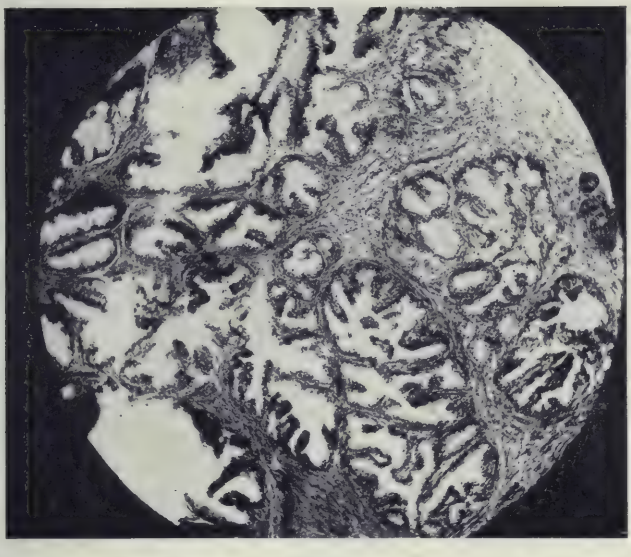


Fig. 26.
Glandular hypertrophy.

Diagnosis.

When a patient complains of frequency of urination associated with difficulty and straining, and says that these symptoms have been present all his life, the presence of a median bar should be suspected. The condition in the majority of cases, however, is not so easily diagnosed, as only a small per cent are of the congenital type. But if we exclude the group of patients operated upon subsequent to perineal and suprapubic prostatectomy, we find the average age to be in mid-life and not in later years, as in prostatic hypertrophy, so that symptoms of obstruction in a middle-aged man are very suggestive of median bar.

On examination the prostate is usually not enlarged, but often indurated and adherent, occasionally irregular, and sometimes atrophic. The seminal vesicles usually show some evidence of chronic inflammatory change.

Catheterization: Careful determination of the residual urine is important.

The findings in our series of cases were as follows:

Complete retention	3 cases.
Large residual (over 200 c.c.)	18 "
Moderate residual (50–200 c.c.)	43 "
Small residual	78 "
No residual	11 "
Not stated	3 "

As important as a complete history and a thorough physical examination are to the diagnosis, they are not to be compared to the necessity of careful cystoscopy. In the median bar type, on viewing the prostatic orifice, there is usually an elevation visible posteriorly, which obscures part of the trigone, even on elevation of the handle of the cystoscope. In simple cases there is no cleft between the median and lateral views but generally a slightly curved

depression; and no enlargement laterally or anteriorly. The trigone is frequently elevated and hypertrophied, with a pouch or depression of the bladder behind it. The bladder is usually more or less trabeculated and sometimes shows numerous cellules, pouches, or even diverticula. In simple contracture without bar formation the prostatic orifice is smooth, but when one looks posteriorly part of the trigone may also be obscured.

When the glands of Home are enlarged they are seen as a small elevation in the anterior part of the trigone near the vesical orifice. When Albarran's group are enlarged they are seen as a small projection posteriorly elevated above and obscuring part of the trigone and with a cleft on each right and left posterior-oblique view. The anterior bar valve or lobule is easily recognized if care is taken. The normal concave anterior segment is replaced by a rounded figure, which may be well studied by raising and lowering the cystoscope.

The appearance of the bladder in contracture and hypertrophy of the Albarran and Home glands is the same as that in the posterior bar type.

A very important procedure is to examine the prostate with the cystoscope in the urethra and the finger in the rectum. In this way the thickness and the extent of the bar laterally may be determined. Not infrequently a firm collar may be felt around the shaft of the cystoscope and sometimes marked subtrigonal thickening is made out.

In 156 cases the following conditions were found on cystoscopy:

Median bar	134	cases
Lateral enlargement	38	"
Anterior lobe	20	"
Polyp at vesical orifice	6	"
Diverticulum	23	"

Trabeculation	43 cases
Stone	15 "
Hypertrophied trigone (marked)	3 "

Treatment.

The pre-operative treatment is the same as that for prostatectomy: that is, to get the patient in as good condition as is possible, but usually the residual urine is so small, and the renal function so good, that it is unnecessary to employ the retention catheter, forced water, etc. The simplicity of the operation and the rapid recovery, however, is no excuse for variation of the rule of careful preliminary study and treatment if necessary. Uræmic, septic patients and those with seriously deranged general health must not be operated upon until greatly improved.

The operative procedure has been described. As to the number of cuts and the portion of the prostatic orifice removed, this is determined entirely by the cystoscopic findings. When the bar is posterior three cuts are usually sufficient — posterior, right and left lateral. The anterior bars are removed in the same manner. When there is contracture, lateral enlargement, or a hypertrophied lobe, it is frequently necessary to make multiple cuts till the instrument does not engage at the prostatic orifice. After a sufficient amount of tissue has been removed to relieve the obstruction a No. 26 or No. 28 Coudé gum catheter is strapped in the urethra.

The post-operative treatment consists in maintaining continuous drainage, forcing water, and keeping the patient quiet, if necessary by the administration of morphia, for a few days. If the catheter should become plugged with a blood clot it should be immediately removed with suction, as the distended bladder, irritated to spasm, causes further hemorrhage.

Irrigations are used only as an aid to remove blood clots. The catheter should be left in the bladder for at least 36 to 48 hours. If at this time there is still bloody oozing the catheter should not be removed till the urine is clear. Too hasty removal of the catheter has but few if any advantages and predisposes to secondary hemorrhage which may be worse than that immediately following operation. The catheters have usually been removed on the third day and the patient allowed up on the fourth. On the sixth or seventh day they may usually be discharged from the hospital. Bladder irrigations of silver nitrate, ten drops of a ten per cent solution to the quart of water, may be given, after which instillations of 10% argyrol every two days until the urine is free from infection.

Complications.

There have been no complications in this consecutive series of cases except hemorrhage. Usually the bleeding is small in amount and quickly stopped, but in a small number of cases the hemorrhage has been rather profuse. It has never been necessary to open the bladder in any simple "punch case" to control hemorrhage. But in one case with cyst at the prostatic orifice which was removed with the cystoscopic rongeur, cauterization of the face of the cyst suprapubically was necessary. We believe that this one objection to the operation has been obviated by the use of a kephalin-coated catheter.[7] The hemorrhage has been trifling since its use. The catheter is coated with kephalin on its terminal 2½ inches, leaving the eye and tip uncoated.[8]

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[7] The Use of Kephalin to Hasten Coagulation and Hemostasis after Surgical Operations. H. L. Cecil, *A. M. A.*, Feb. 24, 1917, LXVIII, 628.

[8] Some preparations of kephalin are inactive. They should be tested immediately before using.

Results.

It is difficult to determine just what percentage of patients have been cured of obstruction and just how many others have been relieved. Sets of questions have been sent to the patients from time to time. When they said they were not relieved of obstruction they were considered not cured; when greatly relieved, the percentage they considered themselves improved was taken as an index; when they could return for examination and said they were entirely well but on examination residual urine was found, they were considered not cured. This method, though not exact, is the best means that can be employed and the table gives too low a percentage of cures rather than an average or too high. Frequent questionnaires have been sent and tabulated are as follows:

Number of patients			cured	83
"	"	"	improved 90%	21
"	"	"	" 75%	17
"	"	"	" 50%	12
"	"	"	" 25%	5
"	"	"	not improved	13
"	"	"	made worse	2
"	"	"	not heard from	3

There is one carcinoma case included in the 83 cases considered cured of obstruction. The patient was known to have had carcinoma and the operation was done for the relief of obstruction. The result was excellent though, as would be expected, he had partial return of symptoms before death four years later.

The patients reporting themselves "90% improved" had no symptoms of obstruction but still had slight pain usually in the back or deep urethra. The same is true to a large extent of those reporting themselves 75% and 50% improved.

What explanation can be made for the poor result of the five who were 25% improved or the thirteen that were not improved? Two patients who reported "25% improved" later showed definite prostatic hypertrophy requiring prostatectomy. The other three cases had marked cystitis, one of which had several large diverticula. Of the cases not improved, five had cystitis, three later underwent perineal prostatectomy, one had pain in the posterior urethra and was treated by various methods without relief. A punch was done for relief of painful symptoms, which it failed to give. One case had perineal prostatectomy before the punch and afterward a suprapubic cystotomy, but was not relieved. One case had prostatitis and seminal vesiculitis. One had a definite median bar with pain on ejaculation; punch was done removing the bar. This failed to give relief and later a stricture of the left ejaculatory duct was found and dilated, with good result.

Of the two cases made worse by the operation, one had had perineal prostatectomy, later a punch, which was followed by incontinence; the other had a punch operation, and later perineal prostatectomy, but was not relieved. He was a hunchback and had a spinal cord condition which was probably the cause of some of the urinary symptoms. It is possible his continence was due to the prostatic hypertrophy and when this was relieved he had incontinence.

From a pathological standpoint the cases not relieved or that had a recurrence showed either an acute inflammatory condition or had a true hypertrophy. In acute inflammations the process, being active, was not cured, but the condition reproduced. In hypertrophies the condition probably started first in these glands — subcervical or subtrigonal — and later manifested itself as a hypertrophy of the prostate.

Conclusions.

1. The operation can be done under local anæsthetic and will remove small obstructions at the prostatic orifice, which is all that it is intended to do.

2. There have been no deaths, though some of the patients were in extremely bad condition before operation and probably would not have stood a major operation.

3. There have been no serious complications.

4. The convalescence is shorter than by any other operation.

5. Careful study of cases with painstaking cystoscopy and examination with finger in rectum and cystoscope in urethra are essential. It is not an operation for general usage.

6. The results obtained make it the ideal operation for obstruction at the prostatic orifice not associated with prostatic hypertrophy and really wonderful cures of long-standing great residual urine have been obtained.

DISCUSSION

OF PAPERS OF DRS. BUGBEE, RANDALL; AND YOUNG.

DR. BRANSFORD LEWIS, St. Louis: I wish to express my sincere and high appreciation of these papers. I do not believe there are any that have been or will be read before this meeting that are more important or of more practical value. Now one reason I say that, is because I believe this whole subject has been very little understood on the part of the general profession. Relatively few of the men who are working in this specialty of genito-urinary surgery have recognized the importance of contractures and obstructions of this nature, and in the general profession it is almost an unrecognized field. One reason that this is important is because there are so many of these cases that are neglected throughout their lives, that begin as a congenital obstruction and go through the early youthful period in long and unsuccessful efforts at urinating, straining and gradually injuring and dilating their bladders, ureters, and kidneys, and the destructive process is so great that finally when they are recognized in their true light they are almost beyond reclamation.

I remember one case — I have seen a number — in which this thing was clearly traceable from the earliest memory of the individual, who was then between twenty and thirty years of age. One I remember distinctly in a young man twenty-three years of age, whose memory of his whole life was connected with difficult efforts at urination. He had a dilated bladder, ureter, and kidney on the left side. On opening the left kidney I demonstrated the actual condition and demonstrated the ring of contracture that surrounded the neck of the bladder. That young man had been treated in various ways throughout his life, which had been a failure up to the time he was surgically relieved by the recognition of this definite condition.

This is only one. I remember a number of them, and no doubt you gentlemen realize the importance of this thing and its lack of recognition on the part of the profession. They recognize prostatic obstruction in elderly individuals, but they seem to know nothing about this condition of contracture that occurs in early life or in middle and advanced life. They think that obstruction means operation. Now, as a matter of fact, I do not believe enough recognition is given to non-operative plans of treatment of this kind of obstruction. I see a great many cases that in the early

part are subject to relief without operating, either by the punch operation, or incision, or fulguration, or simply by dilating with the Kollmann dilator. There are a number of cases amenable to operations short of the punch operation. I must say that, whereas I concede the success of the punch operation, I have never been a convert to it, because I am a little dubious about the inclination to hemorrhage. I have been working on a little different plan, something like that described by Dr. Bugbee, and have had Wappler make for me a cautery knife which is used through the direct cystoscope, and the blade is in absolute control of the operator, applied exactly where you want it, and by a little wheel you can advance or withdraw it. It has been very satisfactory.

I would like to relate one instance of a man who came from another clinic with a suprapubic drainage. He had about fifteen ounces of residual urine. He was in very bad condition of general health, and his kidneys were seriously implicated. I cleared him up with continuous urethral drainage for a while, got him in better condition, and then examined and made a definite diagnosis of contracture and decided it would be better not to operate. I used this fulguration apparatus. The treatment was applied two or three times. The fifteen ounces of residual entirely disappeared, he is capable of emptying his bladder completely, and has been restored to health.

DR. WILLIAM F. BRAASCH, Rochester, Minn.: In regard to the frequency of occurrence, I am under the impression that an obstructing median bar does not occur quite as frequently as we might be led to believe from the large number which have been quoted to-day. In the last four or five years that we have been looking for median bar enlargements we have seen some seventy-five or eighty among the large number of patients that came under our observation during that time.

As to the methods of treatment, I am under the impression that application of the high-frequency current is a rather slow and tedious procedure and not applicable in every patient. The punch operation unquestionably has many advantages; among those is the celerity and ease with which it can be done. I have never observed any instance where the hemorrhage was so alarming as to require any operative interference. It could always be controlled by inserting a large catheter.

It should be emphasized that excision of a hypertrophic median lobe in the presence of any lateral lobe enlargement is not advisable. Such enlargement of the lateral lobes may be discovered only on urethroscopic examination. Furthermore, haphazard

excision of tissue situated at the vesical sphincter, when it is not definitely evident that it causes urinary obstruction, is not a justifiable procedure.

As to the method of the punch operation, the median bar excisor, as originally suggested by Dr. Young, is now most frequently used. The great disadvantage of the Young excisor is the fact that one is unable to observe the field of operation. Dr. Young himself has discarded the lamp and depends entirely on the sense of touch. We learned yesterday that it is poor surgical technique to remove the prostate gland or any portion thereof unless under direct vision. I have an instrument which I would like to show you, which I think obviates such objection and whereby one can see exactly what he is doing. The instrument is a modification of the direct vision cystoscope to which the manufacturer has kindly added my name. It consists of a direct tube, with a light at one end, and a window at the other. Water is the distending medium and we look down through the barrel filled with water, which keeps washing the field of operation free from blood. The field of operation may be easily observed, the obstructing bar being seen from the viewpoint of the urethra, and its exact situation, size, etc., may be plainly seen. Then another sheath is introduced within the first sheath, which has a hook much the same as that in the Young excisor, which catches the bar and holds it firmly. Then a third knife sheath is introduced and the cutting can be watched in every detail in spite of the bleeding. Although the knife is somewhat small, with three punches the desired effect can be obtained.

DR. EDWARD L. KEYES, JR., New York: The problem of prostatectomy for the small prostate has I think been long recognized as the most difficult problem in this line of surgery. Under the title, "The Small Prostate," I mean obstruction at the neck of the bladder, such as has been dwelt upon in the papers under discussion. Obviously, as Dr. Cecil has pointed out, the prime difficulty is that of diagnosis, not only as to the presence of these obstructions, but as to the absence of those two major confusing elements, carcinoma and the paralysis of the bladder due to tabes.

I have used the Chetwood operation a great deal, probably more than anyone else here, in the attack upon the small prostate. Some four or five years ago I made a report before this Association upon what I then considered the final results of the Chetwood operation. I made that report just in time, for my cases have been relapsing ever since. The relapse may occur as late as four or five years after operation. But I am not sure

that these other operations are any more permanently curative. In these cases whose obstruction is almost infinitesimal, the sub-infinitesimal amount of it left behind often leaves the patient as badly off as ever. The difficulty with the Chetwood operation as I see it, therefore, is that its ultimate results are not so good as they should be, just as it is now generally conceded that the ultimate results of the Bottini operation are not as good as they should be, quite apart from its primary results. The Chetwood operation, as you will remember, consists in burning very deep grooves in the bladder neck. Dr. Bugbee does the same sort of thing more superficially, under the guidance of the eye. Dr. Young and Dr. Cecil do the same thing with their punch, though here the original incision, if not so deep, is wider. But all these operations I believe are essentially likely to prove temporary in their benefit, in the sense that five or ten years may find a singularly large number of them recurring. I should be very much interested to hear from Dr. Cecil some statement as to ultimate results. You may ask, What are you going to do about it? Do nothing at all, because you cannot cure a man forever? Not quite. There is one technique which it seems to me may help us sometimes at least to get a permanent result. A good many of these cases have intraurethral lateral lobes that do not appear when you cystoscope them, but do appear when you do a suprapubic section, projecting into the urethra on either side well within the sphincter. These lobes, so far as I know, can only be seen by using the direct vision urethroscope. It is a question whether better results will not be obtained by removing them along with the obstacle at the neck of the bladder. I have employed this technique in several cases, but not long enough ago to do more than to present this rather pessimistic report.

DR. RANDALL: There is nothing to reply to. I do think there is one lesson to be learned; that is, that the day of the so-called small fibrous prostate is past. It is not unusual in clinics all over the country to find on the operation list a prostatectomy for "enlargement of the prostate," and to have the surgeon, after he has exposed the bladder and opened it and found difficulty in enucleation, tell the audience that he is "up against one of those small fibrous prostates." There are two distinct conditions. A small fibrous prostate is *not* an hypertrophied prostate. An hypertrophied prostate is an entity to itself. It is my firm conviction that these fibrous bars are due to an inflammatory condition, probably an inflammatory prostatitis involving the whole gland. When a prostate hypertrophies, it hypertrophies in local

spots, and it shoves out other glandular tissue which is non-hypertrophic against the prostatic capsule, and it is through this line of non-hypertrophic tissue that enucleation in the so-called plane of division lies. On the other hand, the man who tries to do a prostatectomy in the fibrous type, or the so-called small fibrous prostate, has no line of cleavage; the prostate is inflammatory, the connective tissue is increased, the adhesion of the prostatic tissue to its capsule is greatly augmented, and it is a destructive operation that is no longer justified. For that reason I think we should take away with us the lesson emphasized by Dr. Keyes and Dr. Cecil, and realize once and for all that the small fibrous prostate is not a prostate to be enucleated.

DR. CECIL: As to the method of doing the punch operation, I might say that the number of cuts is judged entirely by the cystoscopic findings. The operation is carried out by filling the bladder as full as the patient can comfortably stand, putting the punch in place, drawing the knife out and allowing some water to escape, and then drawing the punch out until it engages some tissue. This is in case the fenestra is directed posteriorly. When the water ceases to flow you know you have some of the tissue. To be sure you haven't caught the trigone you turn the punch to one side or the other, and if it is the trigone, water will flow out of the instrument. This overcomes the objection to the operation.

With reference to Dr. Keyes' question as to late results, the results in these cases have been good enough, we think, to justify its further use. There is no doubt about it that the punch operation has been done in cases which were not adapted for its use, and for this reason it should not have been done. It has been done sometimes for pain, with the idea that by removing the bar which was undoubtedly present the pain would be relieved. It has been done when there was a bad cystitis and evidently a bar was present, but the cystitis has continued and the patients' symptoms have continued. Where there has been a small hypertrophy the patients have been improved, but these patients come back later with a hypertrophy, and some of these have required a prostatectomy later on.

From a pathological standpoint the cases that have not been relieved are the cases that showed an acute inflammatory process. That is, where there was an acute process the condition has continued and has reproduced itself. In hypertrophy, although the obstruction may have been relieved for a short time, the hypertrophy continued and the result was not lasting.

DIVERTICULUM OF THE BLADDER.

JAMES A. GARDNER,
BUFFALO, N. Y.

Cases of diverticulum of the bladder have been reported only within the past few years. The condition is found more frequently to-day because of perfection of our technique with the cystoscope and *x*-ray. These sacs or pouches protrude from the urinary bladder and may be small or large, single or multiple. The writers are generally agreed that they may be divided into congenital or acquired. The acquired are most commonly caused by obstruction (obstacles to urination).

Thomas[1] has gone very carefully into a review of the literature on embryology and ætiology, so that those interested in the subject may refer to this paper. Englisch[2] holds that diverticula having muscular coats are congenital while those with mucous coats are acquired. I am inclined to agree with Lower[3] that all diverticula are acquired originally, because if there was no obstruction there would be no symptoms of the diverticulum.

The sacs vary in size from small ones to those larger than the bladder itself.[4] Since a bladder with a sac which does not empty invites infection, it is not unusual in case of cystitis to find a calculus in the sac.

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[1] G. J. Thomas: *S. G. & O.*, Oct. 19, 1916, p. 378.
[2] Englisch: Isolierte Entzuendung der Blasendivertikel und Perforationsperitonitis. Arch. f. klin. Chir., 1904, LXXIII. 1.
[3] The International Clinics, Vol. 4, series 26.
[4] R. C. Bryan: *American Journal of Urology*, Feb. 1913.

They form very quickly. The cystitis cannot be cured unless the cause as well as the diverticulum is removed.

In Case I a calculus would form even though the bladder were washed twice a day. If the cystitis continues for a length of time the walls become thickened. In Case IV the walls were three-fourths of an inch in thickness. Patients often complain of only smarting and burning at the time of urination. If there is an enlarged prostate the diverticulum may be easily overlooked. These cases, when catheterized, will often show, a few minutes after the bladder is supposed to have emptied, a quantity of urine in the bladder.

Diagnosis.

Diverticula are usually discovered during a routine examination with the cystoscope while looking for the cause of pus or blood in the urine. When the opening or openings are seen the size of the sac is confirmed by *x*-ray. Among the various methods of *x*-ray examination are curling up a shadowgraph catheter in the sac, filling the bladder with bismuth or thorium, one of the silver salts, argyrol, collargol, or argentide. After the bladder has been filled it is examined with a screen until the sac is shown in silhouette and the plate is made in that position. As the only method of cure is by removal of the obstruction and the sac, so that there is no residual urine, the treatment is surgical.

I believe it is important to cystoscope patients before prostatectomy. Various operators differ in opinion as to this necessity, some claiming that it is not necessary and that they can make a diagnosis without cystoscopy. In three cases of this series prostatectomy was advised and diverticulum overlooked, two of the cases being in my own practice.

In one case the diverticulum was discovered after we had performed a cystotomy and in the other it was not until we found the patient still had sixteen ounces of residual urine and a cystoscopic examination was made that the diverticulum was discovered. The third case had a suprapubic prostatectomy and eight months later a perineal prostatectomy by two different surgeons. The patient still had to catheterize himself and had thirty-two ounces of residual urine when I first saw him. I would have preferred explaining to my cases before operation that they had both conditions, and would require a second operation, than to make the explanation after the first operation. I do not think it is good surgery to operate for both conditions at the same time. It is better with these feeble men to divide the shock and give them a rest between operations.

In Case VII, five diverticula were found, three of them large. These three were packed with gauze and resected. The remaining two seemed so small that it was thought unnecessary to resect, but the restrictions about the neck were cut and stretched, which seemed sufficient to make them an integral part of the bladder. The patient made an uninterrupted recovery, had no residual urine, and was discharged. Three months following he returned with 150 c.c. residual urine. On investigation his stricture was found to have closed down and the two small diverticula had increased in size. Dilatation of his stricture relieved him of the residual urine and lavage of the bladder cleaned up his urine. I hope by dilatation of the stricture to obviate operation on the diverticula.

Technique.

The diverticula are usually at the base of the bladder near the urethral opening and are difficult

of access. I believe the best method of attack is to approach the bladder, as suggested by Squier in his trans-peritoneal operation for bladder tumor, stripping the peritoneum off the bladder on the side of the sac. If then the ureter on that side is located and brought into view, it is easy of access if later it becomes necessary to transplant it. Location of the ureter is made very simple by following Beer's method of inserting a ureteral catheter before the operation. This, however, is not always possible. One of the most serious complications in this operation, I believe, is to find the ureter emptying into the diverticulum or attached to the wall of the sac, making necessary its transplanting. Young's suggestion of leaving a little tag of bladder wall attached to the orifice of the ureter when it is dissected from the bladder serves an excellent purpose when the ureter is transplanted, giving something firm to put the anchoring stitch through. A part of the bladder should be selected when transplanting the ureters, which will relieve the ureter from any tension.

After the peritoneum has been stripped off and the ureter located, the bladder is opened above and the diverticulum is made a solid tumor, after Cabot's and Lower's method, by packing with gauze. The sac may now be dissected loose from its attachments except at the neck. It is then inverted and tied off in the bladder and cut with a cautery knife. The bladder wall is reinforced, a stab wound made at the most superior part of the bladder, a Pezzar catheter inserted and the original bladder opening is closed. Drains of rubber tissue are placed down deep to take care of oozing, and an indwelling catheter is inserted in the ureter.

The idea of a separate suprapubic opening for the Pezzar catheter came from Squier. It seems far superior to placing it in the upper end of the original

Fig. 1.
Cystogram of Case 3.

Fig. 2.
Cystogram of Case 5 showing diverticulum on left lateral wall of bladder.

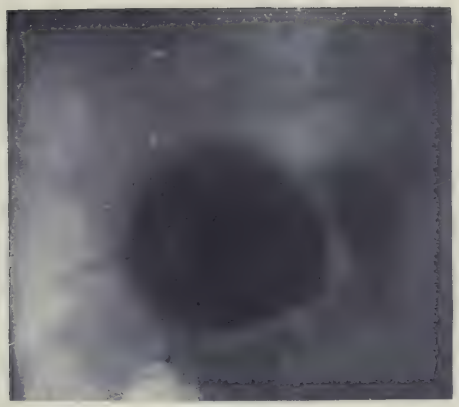

Fig. 3.
Cystogram of Case 7.

Fig. 4.
Cystogram of Case 8 showing diverticulum of left bladder wall.

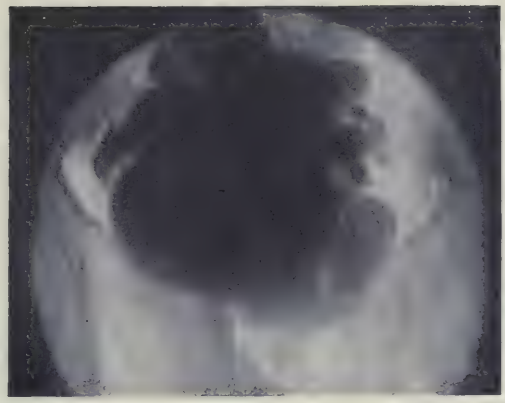

Fig. 5.
After the removal of three large diverticula and the division of the necks of two smaller ones.

Fig. 6.
Cystogram of Case 21 showing two large diverticula on left lateral bladder wall.

opening. More or less slough always comes from the irritation of the catheter, and the sutures of the bladder wall are likely to give way; but by this method the catheter is held tight, the sutures are not affected, and there is no tension because of the two points of drainage. The suprapubic catheter is removed at the end of a week and the indwelling catheter left in the ureter until the suprapubic wound is healed.

Case I. D. D. G., age 68, married. Referred by Dr. W. C. Quinn, Brockwayville, Pa., July 11th, 1910. History of frequent urination for previous three years, up three to four times at night; loss of appetite and loss of weight. Cystoscopy showed large calculus and enlarged prostate. July 20th, 1910, removed large flat calculus 2½ inches across, through suprapubic cystotomy. November 8th, 1910, prostatectomy performed; large adenomatous prostate removed. Following operation there remained a persistent cystitis which would not clear up. He returned August 6th, 1911. Cystoscopy showed two calculi. Suprapubic cystotomy performed. One stone easily removed and the other, dumbbell shaped, was discovered to be fixed in the neck of diverticulum on the left side. Had great difficulty in stretching up neck of diverticulum to free the stone. The patient's condition was not good, and after stretching the neck of the diverticulum as best we could and removing stone, did not attempt to remove the diverticulum. December 16th, 1911, returned to the hospital and had profuse hemorrhage, per urethra, so that at times he could not pass his urine. Urine contained many clots. December 17th, 1911, suprapubic wound broke open, and after continual washing hemorrhage was controlled. Patient was very weak and remained at the hospital three months before bleeding was entirely stopped and his strength regained. Refused

surgical interference and left hospital, washing out his bladder twice a day. October 2d, 1914, continues to wash bladder twice a day to keep himself comfortable. *X*-ray showed diverticulum on left side.

Case II. S., age 80, cotton planter. Examination June 23d, 1913. Complained of blood with clots and detritus in urine during previous three months. Cystoscopy showed diverticulum of the left base of bladder. Bleeding comes from diverticulum. July 8th, 1913, suprapubic cystotomy performed; diverticulum which was small was found to contain a papilloma. Was able to invert the diverticulum, the sac was surrounded with purse-string suture and cut off with cautery knife. There was an uneventful recovery. Dr. Louis E. Schmidt informs me that patient came to him in 1916, with history of blood in urine and difficulty in urination during past few months. Examination showed bladder almost filled with carcinomatous growth. Patient was so weak that he succumbed after an emergency operation of a simple cystotomy.

Case III. D. E. M., age 60, married. Referred by Dr. A. W. Palmer, Oct. 23d, 1915. No history of venereal disease. Thirty years ago while lifting, sprained his back and was paralyzed in lower limbs. Had to be catheterized for five weeks. Since then he has had more or less trouble with bladder. Did not use catheter again until ten years ago when his physicians advised him to wash out his bladder before retiring. One year ago was operated on for a vesical calculus. During past two months his old symptoms have returned. Cystoscopy shows stone in the bladder. November 2d, 1915, litholapaxy. November 5th, cystoscopy showed opening of diverticulum. November 6th, argentide in the bladder showed peculiar picture. November 16th, had operation;

found bladder wall ¾ inch in thickness. It was impossible to pack the diverticulum. There seemed to be sinuses running in various directions, and one-third of the bladder was resected. November 21st, paresis of the bowel developed. Died November 22d.

Case IV. C. Z. R., age 49, widower. Referred by Dr. A. M. Rooker, Niagara Falls, December 22d, 1913. Had gonorrhœa at 20. For past twenty years has had burning sensation on voiding urine. First passed blood six months ago, since then has had frequent urination; sometimes worse when he walks. Urine very dirty; marked cystitis; capacity seven ounces. Stricture in urethra, passed 20 F. Cystoscopy showed diverticulum on right side. Operation refused.

Case V. F. F. B., age 32, married. Referred by Dr. Lyman C. Lewis, Belmont, April 7th, 1915. No venereal history. No illness since childhood. One year previous, after lifting, had left epididymitis. Six months later right epididymis became swollen. Has burning sensation on voiding urine. Examination shows both epididymes enlarged, the left side the larger of the two. Urine shows long shreds. Blood examination, N. W., April 26th, 1916, cystoscoped and catheterized both ureters; urine negative from both sides, diverticulum found on left side. Refused operation.

Case VI. F. H. G., age 55, male. Referred by Dr. Bradley Dorr, January 23d, 1915. Gives history of gonorrhœa twenty-five years ago. No serious illness or accident. His physician discovered stricture ten years ago; has been passing sounds at intervals; three weeks ago began to pass pus and blood; gets up four or five times at night. Examination shows stricture in deep urethra. Can pass 20 F. sounds. Dilated stricture to 28 F. and after irrigation with silver nitrate felt improved. Had three ounces of

residual urine. After passage of instruments had a good deal of reaction. July 23d, stricture contracted and was able to pass 18 F. shot-filled bougie. Had four ounces residual urine. Had so much reaction after passing the instruments, was advised to go to hospital. August 13th, internal urethrotomy performed. Following operation the urine improved, but pus was always present. Each time the instruments were passed, would have chills and temperature, sometimes 104.4°. November 15th, 1915, had five ounces of residual urine; had constant burning on urination. December 14th, residual urine six ounces, passed twenty-nine sound. Advised to have prostatectomy. Felt that he had small median lobe. December 30th, entered Homœopathic Hospital. January 3d, 1916, suprapubic cystotomy. Large diverticulum found, which was resected. Died January 4th.

Case VII. C. G., age 42. First seen December 10, 1915. Had gonorrhœa twenty-five years ago; three attacks since. Five years ago had frequency and blood passed at end of urination. Now has blood mixed with the urine. Examination shows large calibre stricture in posterior urethra and cystoscopy shows an opening of a diverticulum on the left side. Operation January 7, 1916. Diverticulum, after being packed with gauze, dissected loose from its attachment, inverted and tied off in bladder. Made good recovery.

Case VIII. J. D., age 60. First seen August 24th, 1916. Had gonorrhœa, complicated with epidiymitis. For past twelve years has noticed more or less difficulty in passing urine; five months ago began to be catheterized and has had to be catheterized every since. Was referred to me for prostatectomy. Not finding an enlarged prostate per rectum, I thought that he might have a median bar. Examination per cysto-

scope confirmed me in this opinion and he was operated on, September 1st, 1916. Following operation found he had sixteen ounces residual urine and, on cystoscopy, discovered diverticulum, which was confirmed by *x*-ray examination. The *x*-ray pictures showed three large and two small diverticula. On November 13th, 1916, operated for removal of diverticula. Removed three and cut the necks of the remaining two, which seemed small and shallow, and stretched until the pouch was removed. Following this operation he made an uneventful recovery. On February 23d, 1917, he reported and on examination found he had 150 c.c. residual urine. Cystoscopy examination on March 1st, 1917, showed that the two diverticula that had not been removed had distended until they were again distinctly diverticula. *X*-ray March 7, 1917, confirmed this opinion. Have since dilated the urethra widely and patient is able to empty his bladder completely.

Case IX. S. R. D., age 49, residence Niagara Falls. Had gonorrhœa at twenty. Had suprapubic prostatectomy in October, 1915; suprapubic wound did not heal for eight months. Another doctor did a perineal operation, after which the suprapubic wound healed, leaving a large ventral hernia. Following perineal operation patient could not empty bladder and when first seen, January 11, 1917, had a stricture in posterior urethra. Found residual urine of thirty-two ounces. *X*-ray showed large diverticulum at top of bladder. Reason he could not empty his bladder is that the greater part of bladder was not muscular fibres and he cannot exert pressure with his abdominal muscles.

Case X. C. E. B., age 53. First seen March 1, 1917. Father's brother and sister died of tuberculosis. Mother died of cancer. He had pneumonia at fifteen, inflammation of bowels at twenty-one, and typhoid

at thirty-nine. Denies any venereal disease. Had been treated for Bright's disease since 1912; passed blood in urine three years ago; had more or less pain in voiding for nine or ten years. During the past year has lost nine pounds. During past five months has been under care of a chiropractor who washed his bladder and advised him to catheterize himself. Since that time he has been doing so. Has stricture in posterior urethra, passes 24 F. with difficulty. Cystoscopy shows large opening at right side of bladder wall. March 2d, *x*-ray shows two large diverticula. Operation March 10th. Diverticula resected, the lower one with difficulty. Uneventful convalescence.

TRUE PROSTATIC CALCULI.

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Stones occuring in the urinary bladder have been known to the older surgeons for several centuries. While bladder stones are of frequent occurrence and prostatic calculi occur relatively infrequently, nevertheless it is but natural to expect that the older surgeons were also more or less familiar with the occurrence of stones in the prostate. Gläsel, in a recent article, gives a brief historical review in which he states "that the first reports of prostatic stones were found at the end of the sixteenth century. Prior to that time there were no definite reports." Marcellus Donatus, in 1856, reported a case in which a stone was found in the prostate of a man who on coitus could only discharge a little watery spermatic fluid. He also mentions a small stone found in the prostate of a physician. Jacob Douglas, in the beginning of the eighteenth century, described a hard body the size of a pea found in the prostate of an old man. Thirty years later (1737), Pohl gave a more accurate description of the affection. From this time on there were more accurate reports of these concretions by Louis (1747), and in 1762 Morgagni made his report on the corpora amylacea, which is still classical. Other reports were by Home in 1811–13, by Amussat in 1832, and by Marcet in 1883. But in spite of this, Civiale stated in 1838 that "their origin is very dark; they have not been studied accurately enough

so that it can be said under what pathological conditions they are formed nor what organic changes lead to their formation."

Prostatic calculi are generally classified as true and false. By true prostatic calculi are meant calculi that are situated within the substance of the prostate gland. They are further classified as primary or endogenous, and secondary or exogenous.

By false prostatic calculi are meant urinary calculi that have become lodged in the prostatic urethra. This group of cases obviously does not belong to true prostatic stones and should not be included with them. In many of the cases reported in the literature, however, no such sharp distinction is made, and cases are erroneously recorded as prostatic calculi when they should be reported as cases of calculi in the prostatic urethra. This paper will be limited to a discussion of true prostatic calculi only.

Primary prostatic calculi have their origin within the prostatic tissue. They consist in the main of phosphates, carbonates, or oxalates of lime, or magnesia or triple phosphates.

Lassaigne (quoted by Gläsel) gives the following composition of primary stones:

Calcium phosphate	84.5%
Calcium carbonate	.5%
Organic material	15%

Dupuytren (quoted by Gläsel) gives the composition of four stones obtained from a patient aged forty-one, as follows:

Calcium phosphate	60%
Ammoniomagnesium phosphate	20%
Calcium carbonate	20%

Secondary prostatic calculi can be differentiated from the primary by their chemical composition,

the nucleus in these cases being composed of urates and earthy phosphates. The difference between the primary and secondary calculi must rest upon the chemical examination of the nucleus, for in this way only is one able definitely to determine whether one is dealing with a primary or a secondary stone.

Secondary stones may have an outer coating of the same composition as the true calculi. Hence the importance of the determination of this point, namely, to have the center of the stone subjected to careful chemical examination. The opposite may also be true. A primary prostatic stone may be covered with urates in cases in which a communication exists between the cavity harboring the calculi and the urethra.

A review of the literature on prostatic calculi reveals several rather interesting facts, the more important of which appear to be the following:

1. That prostatic calculi occur more frequently than is generally believed.

2. That great carelessness in reporting the cases is obvious. Many of the case reports do not show an attempt to separate the cases of true from those of false prostatic stones.

3. That the symptom complex presented by these cases is not always typical.

4. That in some of the more recent case reports, the routine employment of the Roentgen-ray has not been resorted to, so that the use of this diagnostic aid is not as universal in the diagnosis of this condition as it is in the diagnosis of calculi occurring in other parts of the genito-urinary tract. The routine employment of the Roentgen-ray for the demonstration of these stones in all obscure cases should be strongly urged, especially in the cases of so-called chronic prostatitis which do not respond to the usual forms of treatment.

A careful review of the literature shows that more cases have been reported than is generally known. Most writers who have published cases call attention to the fact that the number of cases that have been reported is very small. Thus, Gläsel, including his own two cases, was able to bring the total number of cases reported up to fifty-four. In this review, records of one hundred and sixty-five cases have been found. With the eight cases reported in this paper, the number of recorded cases is brought up to one hundred and seventy-three. Doubtless many cases have been overlooked. Furthermore, because of the indefinite and incomplete reports of others, there may be a few that have not been included. Cases about which there was the least bit of suspicion as to their true nature were not included.

During the past two years I have had the opportunity of seeing eight cases, and believing that these are of sufficient interest to warrant reporting, I take pleasure in presenting them here:

Multiple Prostatic Calculi.

Case I. Dr. B., aged 50. Present Complaint: *Frequency of urination.* This began fifteen years ago. When the frequency was at its worst, he voided every hour or two during the day and three times at night. *Pyuria.* Eight or nine years ago the patient was refused life insurance because of the presence of pus in the urine, which is still present. *Passage of calculi.* This first began two years ago. In all, the patient has passed about sixty small calculi. He has also had many removed by means of an endoscope. *Rectal irritation.* This is not constant, depending upon the urinary symptoms. When these are worse the rectal symptoms are worse. *Pain in the right side.* This has been present for four years and is of a colicky nature. The pain is described

as being present over the cæcum. It bears no relation to the urinary act, but when the urinary symptoms are worse the pain is worse.

Rectal Examination: The prostate is larger than normal and firm in consistency. At the apex of the right lobe can be felt a very hard area which is quite sensitive. Pressure of the finger produces a sensation of crepitation. The left lobe is hard and sensitive. The fluid expressed from the prostate by massage revealed the presence of pus.

Roentgen-ray Examination: The roentgenogram reveals the presence of five large shadows situated immediately behind the symphysis pubis, compatible with shadows produced by calculi in the prostate (Fig. 1). A roentgenogram taken several years ago, which was brought in by the patient at the time of his examination, showed the presence of many small shadows behind the symphysis pubis. By comparing the two roentgenograms, it would appear that the smaller calculi have become agglutinated so as to form the five large calculi seen in Fig. 1.

Chemical Examination of Calculi: "Three hard irregular-shaped brownish yellow calculi, varying in size from a pinhead to a wheat grain. These calculi consist largely of calcium oxalate with a small amount of unidentified organic detritus (R. W. Webster)."

Urinalysis: Cloudy, 1020, albumin, pus, no sugar. Sediment contained pus in large amounts and short bacilli in the stained sediment (B. coli).

Recurrent Prostatic Calculi.

Case II. Mr. N., aged 50. Previous History: Ten years ago, the patient underwent a perineal operation for prostatic stones. At this time five were removed. He also gives a history of having had gonorrhœa many years ago, which he thinks had

been present for years. This was treated with sounds, massage, and irrigation.

Present Complaint: *Pain in the neck of the bladder.* This has been present off and on for several years and bears no relation to the act of urination. *Frequency of urination.* This has been present more or less since his previous operation. The patient voids every two hours during the day and is obliged to rise once at night. *Urethral discharge.* This is slight in amount and is present more or less constantly.

Rectal Examination: The prostate appears normal in size and shape. The surface is irregular and hard in spots. These hard areas are very sensitive and suggested the possibility of stones. A sensation of crepitation is elicited. Microscopic examination of the fluid expressed from the prostate revealed the presence of pus.

Cystoscopy: This shows the presence of a slight cystitis around the neck and the base of the bladder. No calculi were found in the bladder.

Roentgen-ray Examination: The roentgenogram shows the presence of three shadows immediately behind the symphysis pubis, compatible with shadows produced by calculi in the prostate (Fig. 2).

Urinalysis: Alkaline, 1012, albumin a trace. Microscopic examination shows the presence of pus cells and bacteria. A culture reveals the presence of B coli.

Prostatic Calculi Associated with Tuberculosis of the Epididymis.

Case III. Mr. L., aged 30. Present Complaint: Swelling of the right testicle and a discharging sinus in the right side of the scrotum. The patient states that the trouble began two years ago last March. There was no pain or tenderness associated with the swelling, and there was no history of trauma. Four

months later an incision was made into the scrotum for drainage. The patient has seen pus but no blood in the urine. He has never passed a stone. He had gonorrhœa six years ago.

Examination: The right testicle is enlarged and nodular. The epididymis is enlarged, both poles and body. There is a small opening through the skin into the globus minor.

Rectal Examination: The prostate is not hard, not enlarged, and not tender.

Roentgen-ray Examination: The roentgenogram (Fig. 3) shows the presence of two small shadows behind the symphysis pubis, compatible in size and shape with calculi in the prostate and with the stone passed after the rectal examination (see below).

Urinalysis: Cloudy, straw-colored, 1014. No albumin, sugar, or casts. Microscopic examination showed pus cells.

Passage of Stone. After the rectal examination, the patient was asked to void, and in the voided urine a small calculus was found.

Chemical Examination of Calculus: "One hard light yellow calculus of the size of the head of a black pin. This calculus consists largely of calcium carbonate with a small amount of calcium oxalate and only a trace of organic detritus (R. W. Webster)."

Prostatic Calculi Associated with Vesical Calculi.

Case IV. Mr. A. K., aged 21. Present Complaint: Six months ago, the patient began to have painful urination, which is still present. There also had been considerable difficulty in starting the stream and the patient has had more or less dribbling at the end of urination. He states that occasionally there is a sudden stoppage of the stream. He further states that the urine has always been clear and that

he has never passed blood. He denies all specific infection.

Cystoscopic Examination: Many small calculi were seen in the base of the bladder. These were removed with an evacuator and one hundred and fifty-seven stones were obtained. The patient was cystoscoped again in five days and no stones were found in the bladder.

Roentgen-ray Examination: The roentgenogram (Fig. 4) shows the presence of shadows, compatible in size and shape with calculi in the prostate. This roentgenogram was obtained after the bladder calculi were removed with the evacuator and after the second cystoscopic examination demonstrated that the bladder was free from calculi, so that the possibility that these shadows are due to calculi in the bladder is excluded.

Chemical Examination of the Bladder Stones: "One hundred fifty-seven hard, light yellow calculi, varying in size from a pin point to a millet seed. These calculi consist largely of calcium oxalate with a small amount of magnesium and calcium phosphate and a very small amount of organic detritus (R. W. Webster)."

Urinalysis: Clear, acid, 1022; albumin, a trace; sediment, a few red blood cells; few leucocytes.

Prostatic Calculi Associated with Nephritis.

Case V. H. R., aged 46. Present Complaint: The patient denies syphilis and gonorrhœa. Five months ago he noticed a parietal headache appearing at night. Two weeks ago he had severe attacks of nausea and vomiting, which had no relation to the taking of food. Five days before admission to the hospital he had severe colicky pains in the abdomen which lasted for four hours. One week ago the patient noticed that the urine was bloody. There were no other urinary symptoms.

Examination: The cystoscopic and rectal examinations were negative. Ureteral catheterization showed the following: the urine from the left ureter was clear; that from the right, bloody.

Urinalysis: Examination of the urine from the left side shows the presence of albumin and casts; that of the right side shows blood.

Roentgen-ray Examination: The roentgenogram was negative for stones in the kidney and bladder. Behind the symphysis pubis are seen many small shadows, compatible with calculi in the prostate(Fig.5).

Prostatic Calculi and Cerebrospinal Syphilis.

Case VI. F. A. K., aged 57. Present Complaint: Four weeks ago the patient began to complain of pain in the hypogastrium following urination. The pain came on abruptly and was sharp and cutting. It was especially severe when defecation took place with urination. It caused him to double up, and at times he also had pain in the epigastrium. Walking sometimes aggravated or brought on the pain. Four or five days after the onset of this trouble, the patient developed incontinence, so that he was obliged to wear a rubber urinal. There has been some difficulty in starting the stream, which is slow, lacks force, and dribbles.

Examination: The patient is a well-developed and well-nourished man. The pupils are equal and slightly irregular. They react slightly to light and test well for accommodation. Finger to finger causes slight inco-ordination. The knee jerks are equal and normal. The babinski is constant on the left side. Pain sense is diminished in the arm, chest, abdomen, and legs.

Urinalysis: There is no albumin, sugar, or blood in the urine. It contains a few granular casts and leucocytes. The culture is sterile.

The blood Wassermann was positive. The spinal fluid Wassermann, Nonne, and Lange were also positive; cells, 88.

The rectal examination was negative.

Roentgen-ray Examination: The roentgenogram (Fig. 6) shows the presence of many small shadows behind the symphysis pubis, compatible with shadows produced by prostatic calculi.

Prostatic Calculi Associated with Chronic Prostatism.

Case VII. N. N., aged 44. Past History: The patient had his first attack of gonorrhœal urethritis when about twenty-one. His next attack was at twenty-three and the third at twenty-five. In the spring of 1902 he had an internal urethrotomy. The patient was subsequently married and has four healthy children.

Present Complaint: In February, 1916, he began to suffer from pain in the left kidney region, and turbid urine, for which I was consulted.

Cystoscopic examination was negative. Ureteral catheterization was easy and without obstruction. Cultures made from the catheterized kidney specimen showed the presence of bacillus mucosus capsulatus.

Rectal examination showed the prostate to be firm in consistency. The prostate strippings showed the presence of pus.

The roentgenogram showed the presence of prostatic calculi (Fig. 5).

Prostatic Calculi Associated with Benign Hypertrophy and Stone in the Ureter.

Case VIII. Mr. W., aged 60. Past History: The patient states that his present illness began about three years ago with bladder distress. Frequency of urination was the first symptom the patient

noticed and at first he was obliged to rise once or twice at night. At the present time he is obliged to void from three to five times every night. Burning on urination began at about the same time that he noticed the frequency. The patient has had two attacks of complete retention of urine; one attack was relieved by a single catheterization. The second attack lasted for about a week, during which time the patient had to be catheterized three times a day. During the attacks of complete retention the patient had chills and fever and sweats. There is also a rather indefinite history of right-sided renal colic.

Roentgen-ray examination shows the presence of a stone in the ureter and the presence of calculi in the prostate (Fig. 6).

Rectal examination shows a uniformly enlarged prostate; both lobes are easily palpable. The prostate is smooth and soft and not tender. No sensation of crepitation was elicited.

Occurrence.

It is usually stated in articles dealing with this subject, as well as in text-books, that prostatic calculi are very rare, and, in fact, that they are so rare as not to have any clinical importance. Thus, Legueu, in 1895, wrote that there were no calculi in the prostate, only in the prostatic urethra, and Marion, in 1906, said that their existence was uncertain and at any rate they had no clinical importance (Tanton). It would seem that this traditional statement has been handed down from one writer to another without any serious attempts having been made to disprove it. That these cases are of clincial importance is evidenced by the clinical reports of cases. The fact that a review of the literature has brought to light one hundred and sixty-five cases exclusive of the cases reported in this paper, is positive

proof that they are not infrequent. No doubt there are many patients suffering from prostatic calculi who do not obtain relief, owing to the fact that the condition is overlooked, or perhaps it might be better to say that the possibility of the presence of such stones is not considered, so that many cases are treated by massage, irrigations, etc., without benefit.

Theory of Formation.

Up to the present time, the origin of prostatic calculi has not been determined and the various views expressed are purely theoretical. Because of the frequency of chronic urethritis, many believe that this condition plays an important rôle. Yet there are many cases in which a history of previous urethral infection cannot be obtained. A history of gonorrhœal infection was present in three of my cases, it was denied in two cases, and in three cases no mention of gonorrhœa was found in the history.

Rochet believes that prostatic calculi result from chronic urethritis. Pousson is willing to accept the explanation of Pasteau until a better one is offered, namely, that they are due to a mild chronic infection of the acini and excretory ducts of the gland. The fact that they are almost always observed in the adult after posterior urethritis gives credence to this view. It is believed that this local chronic infection gradually causes certain salts of the urine to be precipitated and deposited around the normal concretions of the gland through the dilated prostatic tubules.

Tarnaud is of the opinion that these calculi are formed by the deposits of salts, chiefly phosphates and carbonates of lime, around a nucleus composed of normal prostatic concretions. Their formation is due to mild chronic infections.

Adams states that the prostatic concretions may become the nucleus of a calculus.

According to Socin and Burckhardt, prostatic calculi may be formed by encrustation of the prostatic concretions, and they state furthermore that it has been shown at autopsy that ordinary suppurative inflammations of the prostate may exceptionally end in the thickening and calcification of small circumscribed foci of pus and thus form stones in the gland.

Rochet and Moutot believe that it is generally admitted that large prostatic calculi are the result of encrustation with phosphates and carbonates of lime of the physiologic concretions of the prostate.

Tanton concludes that true prostatic calculi are the result of calcareous encrustation of the physiologic albuminoid concretions of the prostate. If the calculus is sectioned and an organic nucleus found, it proves its endogenous origin.

It is the belief of Albarran that the concretions are physiological and that prostatic calculi are formed from them by conglomeration of a great number or by the deposition of calcium phosphates.

According to Spencer the origin of prostatic calculi is found in the protoplasm of degenerated gland epithelium around which colloid material is deposited. This eventually undergoes amyloid degeneration. Subsequently mineral salts are deposited around it, calcium phosphates, calcium carbonates, animal matter, and pigment.

Crosse, in his article, states that prostatic calculi are formed in the ducts of the prostate gland, deposited from its natural or disordered secretion and composed uniformly of phosphate of lime. They seem to be sufficiently often combined with stone in the bladder to lead us to suspect that the one disease helps to cause the other, and he believes that urinary calculi, stricture of the urethra, or any disease causing inflammation of the prostatic part of the urethra and

interrupting the free exit of prostatic excretion, disposes to the formation of prostatic calculi.

Gläsel is of the opinion that the primary calculi are formed in the parenchyma of the gland itself, the nucleus being formed of corpora amylacea or necrotic bits of tissue. They increase in size by encrustation with phosphates, carbonates, or oxalates of lime or magnesia or triple phosphates.

Symptomatology.

Clinically, cases of prostatic calculi may be divided into three groups:

1. Those cases in which the calculi are found in a more or less accidental manner and in which the calculi are not producing any symptoms; that is, the patient comes to us seeking relief for another condition, as did the patient in Case V, who was suffering from hæmaturia due to chronic nephritis. As a part of the routine examination the stones were found. In another case (Case VI), the patient came in because of bladder symptoms due to cerebro-spinal syphilis, and the shadows were found in the Roentgen-ray examination.

2. Those cases in which the calculi are associated with benign hypertrophy of the prostate and in which the clinical picture is that of benign hypertrophy. The patient seeks relief not from his prostatic calculi, but from an enlarged prostate, as was the case in Case VIII. As a result, the presence of the calculi is generally not recognized before operation. They are usually found at the time of the prostatectomy. In this group of cases the calculi may be found located within the gland substance proper, or they may be found situated between the gland and its capsule. Cases belonging to this group have been reported by Fowler, Keen, MacGowan, Krotozyner, Lund, Naumann, Tédénat, Moucharinsky, Chopart, and others.

In Fowler's case, the calculi were found to be situated between the prostatic capsule and the gland tissue.

3. Those cases in which the symptoms are due to the presence of the calculi, and the patient comes to us directly for the relief of this condition. It is this group that is usually meant when the subject of prostatic calculi is mentioned.

The symptoms are not always characteristic, so that it is not possible to make a diagnosis from the clinical history alone. This and the fact that it is rarely thought of as a possibility may explain why the diagnosis is not made oftener than it is.

The symptoms of prostatic calculi may be conveniently divided into four more or less arbitrary groups: prostatic, urinary, sexual, and rectal.

1. Prostatic symptoms may be considered as being directly due to the presence of the calculi in the prostate. The most important are (a) pain, (b) passage of the calculus, and (c) abscess formation with or without resulting fistula.

(a) Nearly all patients complain of pain at some time or other during the course of their illness. This pain is often associated with urinary distress, although sometimes it is absent. The pain may be localized in the prostate and be referred to as being in the prostate. Very often, however, the pain may be referred to the perineum, anus, penis, scrotum, urethra, suprapubic area, and occasionally it may be referred down the thighs. Sometimes the perineal pain is described as being very severe, while at others it may be described as a feeling of weight or heaviness in the perineum. The pain in the perineum may be aggravated by sitting, so that the patient may avoid sitting directly on hard surfaces. In Case I of my series the pain was referred upward toward the cæcum.

(b) Passage of prostatic calculi per urethra does not occur very frequently and hence must be classed

as one of the unusual symptoms. It is easy to see how this symptom could be mistaken for the passage of urinary calculi. Cases in which calculi were passed have been reported by Golding-Bird, Joshua, Lund, Lydston, Lister, Rohdenburg, Rochet (2 cases), Santesson, Stoecker, and van Imschoot. Stoecker's patient passed about one hundred calculi and Santesson's patient discharged twenty-two. To these cases must be added my first case, this patient having passed stones over a period of many years. In several instances, the calculi have been removed by the endoscope. In cases in which the calculi were large, their presence interfered with urination, but, as a rule, the calculi are small and not large enough to produce obstruction.

(c) While abscess formation with or without resulting fistula is exceedingly rare, cases have been reported in which fistulæ were present that were undoubtedly the result of prostatic calculi. In some of the cases the calculi were removed through the fistulous openings (Dupuytren, Joshua, Crosse, Barker, and Devin).

2. As would naturally be expected, the urinary symptoms are the predominating ones and all sorts of urinary symptoms are mentioned in the various case reports. In twenty-eight cases, frequency of urination, either alone or associated with other symptoms, was present. In sixteen cases painful urination was recorded. Difficult urination was present in seventeen cases, and dribbling in five. Burning urination, difficulty in starting the stream, incontinence, dysuria, tenesmus, vesical irritability, hæmaturia, residual and retention, have all been mentioned. The retention in some cases was complete, in others incomplete. In twenty-seven cases there was either complete retention, or the patient was obliged to use the catheter part of the time.

3. The sexual symptoms generally do not occupy as prominent a position as the urinary symptoms. Yet in several instances they were the chief complaint. Diminution in the sexual desire, weak erection or complete failure of erection, aspermia, hæmatospermia, and discharge of a watery spermatic fluid are mentioned in the literature.

4. The rectal symptoms are rectal tenesmus, pain in the rectum and anus, and painful defecation.

Associated Pathological Conditions.

In seventeen cases there is recorded the presence of urethral stricture. In one case (Hey) the prostate was described as being gangrenous. In fifteen cases the prostate was described as being enlarged (benign hypertrophy) and in one case (Lund) the question of malignancy of the prostate is mentioned.

Of interest in this connection is the occurrence of stone in the urinary organs. Calculi are recorded in the bladder in ten cases. Case III of my series added to this number brings the total up to eleven. In Longuet's case, calculi were also found in the kidney. In Case VIII there was an associated stone in the ureter and some enlargement of the prostate.

Recurrence.

It is a well-established fact that gall stones, bladder stones, and kidney stones do recur after their surgical removal, and it is but natural to expect that prostatic calculi may also recur. Although this is the natural inference, yet in a review of the literature, I have been able to find but two cases on record, those reported by Hock and Belfrage. These are the only cases in which a recurrence is recorded as far as I know. Case II of my series is therefore the third case of true recurrence to be reported.

If we stop and consider the pathology for a few

moments, one can easily see how a recurrence may take place, especially in cases in which the cavity harboring the stone is very large and in the presence of much infection. In Hock's case the operation for recurrent stone was performed two years after the first operation. In Balfrage's case the diagnosis of recurrence was made ten years after the operation. In my case there was also an interval of ten years.

Diagnosis.

The diagnosis of prostatic calculi can be definitely established in every case by the aid of the Roentgen-ray. It is surprising, in view of the fact that the Roentgen-ray is perhaps the one agent that gives us the most information in the diagnosis of this condition, that its routine employment is so often neglected. Its routine use after the operative removal of stones should always be carried out, so that one may be sure that all of the calculi have been removed. This negligence is very plainly demonstrated by a review of the recent case reports in the literature, a large number of which do not mention the Roentgen-ray findings. This certainly is unfortunate, as doubtless many of these sufferers seek relief without finding it and are often subjected to many needless examinations and to prolonged courses of treatment without obtaining relief.

Forssell, in 1909, was able to find only four cases in the literature in which the roentgenographic findings were given, those of Golding-Bird, Lydston, Albers-Schönberg and Haenisch. Since then cases have been reported in which the diagnosis was made by the aid of the Roentgen-ray by Cholzoff, Cochez, Brickner, Moucharinsky, Naumann, Ravasini, R. Thompson, Voelcker, and in the cases reported here.

Forssell has described two types of shadows. One in which the calculi are very small and round, varying

Fig. 1.
Case 1. Multiple Prostatic Calculi.

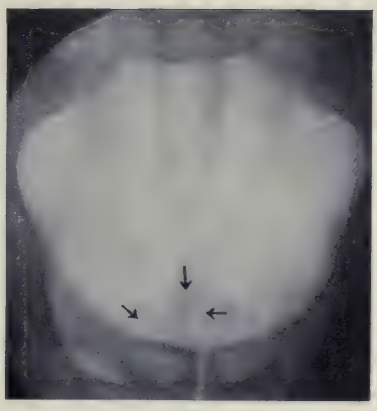

Fig. 2.
Case 2. Recurrent Prostatic Calculi.

Fig. 3.
Case 3. Small shadow in region of prostate, corresponding in form to calculi obtained by prostatic massage.

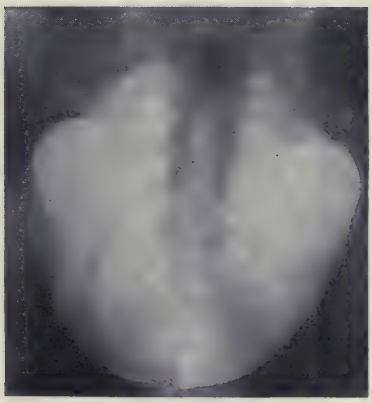

Fig. 4.
Case 4. Calculi in prostate. Roentgenogram taken after 157 stones were removed from the bladder.

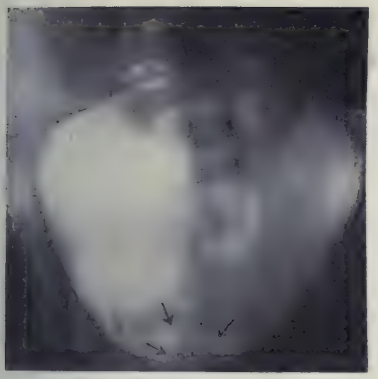

Fig. 5.
Case 5. Prostatic Calculi associated with chronic nephritis.

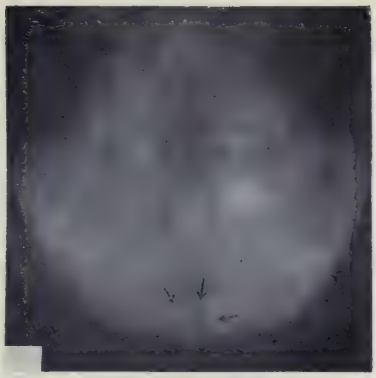

Fig. 6.
Case 6. Prostatic Calculi associated with a stone in the right ureter.

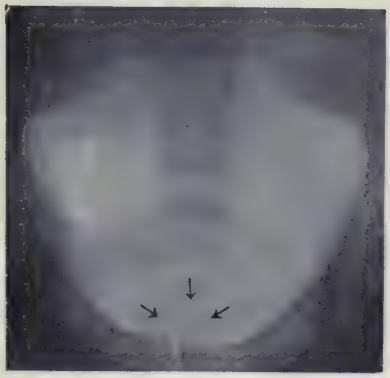

Fig. 7.
Case 7. Prostatic Calculi associated with prostatitis.

in size from a pinhead to a hemp seed, and are arranged symmetrically in small groups near the mid-line.

That this arrangement may change is also demonstrated in Case I, in which the roentgenogram taken two and a half years ago shows this typical arrangement. The recent roentgenogram (Fig. I) shows the presence of five large stones. The second type shows a conglomeration of small roundish shadows, packed close together and lying symmetrically on both sides of the mid-line.

An examination of the roentgenograms in this series of cases shows that the grouping of the shadows is by no means constant. The large stones in Fig. 1 are grouped on both sides of the mid-line and in Fig. 2 all of the calculi are apparently located in one of the lateral lobes.

The smaller calculi may be located in the mid-line, to one side of it, or they may be located on both sides of the mid-line, Figs. 3, 4, and 5.

Next in importance to the Roentgen-ray findings are the results of the rectal examination. There are four signs that one elicits upon rectal examination that aid in making the diagnosis. These are (a) crepitation, (b) palpation of the stone, (c) expressing the calculus from the prostate, and (d) changes in the prostate.

While one of these symptoms can be elicited in nearly all cases, nevertheless there is a certain number in which the diagnosis cannot be made from the rectal examination, so that one cannot be justified in making the statement that because the rectal findings are negative prostatic calculi may be excluded. It is easy to see how one could miss calculi that are deeply situated in the prostate or that are very small, because they would be hard to examine.

(a) Crepitation, when elicited, has often been mentioned as being pathognomonic of prostatic calculi.

Its absence, however, does not exclude their presence. It is usually produced by the grating together of several large calculi in a cavity produced by their presence. It is a symptom that was much relied upon by the earlier clinicians. It was mentioned as being present in the cases reported by Bogdanow, Brongersma, Cholzoff, Cooper, Golding-Bird, Mouchar-insky, Pavlow, Pernaud, Rohdenburg, Santesson, Silvanski, Stoecker, Svensson, and Tarnaud. Crepitation was elicited in two of my cases.

(b) In order to demonstrate stone by direct palpation the calculus must have attained fairly large size. In cases in which the stones are fairly large, the parenchyma of the gland surrounding the calculus has often become more or less atrophic, so that the calculus may be easily felt. In two of my cases I was able to palpate the stones through the rectum. As previously mentioned, when the calculi are large one has no difficulty in palpating them. Many of the case reports mention this fact, namely, that the stone or stones were felt through the rectum — Cholzoff, Falcone, Levison, Naumann, Pernaud. In the cases reported by Polya and Ravasini, the stone was indistinctly felt, while in Voelcker's case, reported by Gläsel, the prostate was very hard and a stone was suspected. Locquin reports a case in which the prostate was distended and full of stones.

(c) Expressing the calculus from the prostate by prostatic massage may occur in cases in which the calculi are small, and when one can demonstrate the calculi in this manner our suspicions of the presence of more calculi in the prostate should be verified by roentgenograms. Calculi have been expressed from the prostate in the cases of Balassa, Bonneau, von Felecki, and Svensson, and in Case 3 of this series.

(d) The rectal examination in many cases demonstrates an increased consistency of the prostate,

which may or may not be associated with an increase in the size of the prostate. At times the prostate may be described as being as hard as stone. Increased consistency of the prostate occuring in early adult life should arouse one's suspicions for the possibility of the presence of calculi, whereas in older persons, increased consistency may be significant of malignancy. The prostate may be uniformly hard, as in the cases reported by Bogdanow, Fowler, Lister, Lund, Mastin, Maunder, McMunn, Polya, Pousson, and Jaubert de Beaujeu. Sometimes this increased consistency may be more or less nodular, so that the finger in the rectum obtains a sensation of a hard nodule being present in the prostate. Such cases have been reported by Brongersma, Lund, Psalidas, Rohdenburg, van Imschoot, and others.

Treatment.

The clinical classification of cases as given above may be used as a guide in outlining the surgical treatment.

Thus, the cases of small multiple calculi that are not producing symptoms and are discovered in a more or less accidental way during the routine examination do not call for surgical treatment. Their presence should be noted and their progress controlled by repeated Roentgen-ray examinations.

The second group, namely, those cases in which the calculi are associated with benign hypertrophy of the prostate, are usually candidates for prostatectomy, and at the operation the calculi are removed. The condition calls for surgical intervention for the benign hypertrophy, the presence of the calculi being merely an incident.

In the third group of cases, the indications are to remove the calculi because of the subjective symptoms which they produce.

The non-operative measures, such as removal of the calculi by massage or by the endoscope, are methods that have a very limited field of usefulness, and at best must be considered as temporizing measures.

The radical removal of the calculi can be best performed by perineal prostatomy. When the calculi have been removed, one should thoroughly examine the wound to see that no stones have been overlooked. It is necessary to break up any septa that may be present, so that all possible sites for the reformation of stones are removed.

In cases of recurrent calculi, one must consider carrying out some procedure that will prevent further stone formation and with it a return of the symptoms. With this end in view, it would seem logical to perform prostatectomy.

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DISCUSSION

OF PAPERS BY DRS. GARDNER AND KRETSCHMER.

DR. GILBERT J. THOMAS, Minneapolis: I want to emphasize a few points in Dr. Gardner's paper. Twenty or more cases that I reviewed a year ago showed the presence of obstruction in 86 per cent. The coincidence of stone in diverticulum of the bladder should also be remembered. It is always a good plan to make a plain roentgenogram before the introduction of the shadow-casting fluid or the shadow-casting catheter for cystography, as in this way stones can be demonstrated which might not be visible in the injected cystograph. In my experience, it has been easier to demonstrate a diverticulum in the roentgenogram with the use of a shadow-casting catheter than when the shadow-casting fluids were employed. The catheter should be warm and pliable and should be lubricated with a non-oily substance, so that it can be coiled up in the diverticulum. Another point to be remembered is the coincidence of papilloma and carcinoma with diverticula. I have reported two or three such cases.

In the diagnosis of prostatic calculi a complete roentgenogram should be made, not only of the prostate but of the kidneys and ureters. The percentage of occurrence of stone in the kidneys and ureters in connection with prostatic calculi, I do not remember; but in a series I looked up some time ago it was frequent enough to warrant this procedure. I believe we will be repaid by taking roentgenograms of the prostate even in young individuals, as many of these chronic sufferers show calculi in the prostate gland. Old men with hypertrophy of the prostate and stone, or stone without hypertrophy, are usually bad operative risks.

DR. W. W. TOWNSEND, Rutland, Vt.: I was very much interested in Dr. Kretschmer's paper with regard to prostatic calculi. Dr. Thomas brought out the point that we frequently see stones in the prostate in young individuals; this corroborates my observations. In a paper which I read at Washington I reported a case of a young man of nineteen years of age who had all of the symptoms of prostatic obstruction, which proved upon operation to be prostatic calculi within the gland substance, producing a tumor, which occasioned the obstruction.

DR. EDWARD L. KEYES, JR., New York: In reference to prostatic calculi, while complimenting Dr. Kretschmer on his paper and agreeing with him in the main, I will take up your time only with one or two points of difference.

It has been my clinical impression, as perhaps it is his, that in most instances prostatic calculi were symptomless at the time I saw them. Whether they are forever to remain symptomless, it is difficult to say.

In the second place, I have seen but one case of a rather large single prostatic calculus, as judged by the *x*-ray and removed by another surgeon (I did not see it), of which the prime symptom was considerable pain. How difficult it is to diagnose that pain will be apparent to you when I tell you that the patient had been in the hands of two distinguished urologists, known to you all, before he came to me. One of them had removed his left kidney for tuberculosis — which, so far as appears, he did not have. The other one was washing out the pelvis of the kidney, putting the cystoscope over that painful prostate, when he came to me, and I was equally unsuccessful in diagnosis. He then went to a friend who told him the *x*-ray showed everything in the world — and it did.

I have seen stone in association with carcinoma, ordinary prostatism, and with various other lesions, and it has seemed to me that in almost all cases it is unimportant. I have operated on only two cases, and I expect next week to operate on another, in which the calculi are associated with prostatism.

My impression differs a little from Dr. Kretschmer as to the frequency of these calculi. I think they are a pathological commonplace. Any pathologist will confirm this. The pathologist does not associate them with any grave lesion. Furthermore, they have led me once into a definite and very sad mistake of drawing the family of the patient to one side and telling them how sorry I was that the old man had a carcinoma of his prostate. He is five years further along now, doing very well, and I had him *x*-rayed recently and found these calculi. I was able through that knowledge to save another man from a similar mistake, in which case the prostate felt exactly like carcinoma.

A MEMBER: I wish to report a case of diverticulum of the bladder in a man fifty-two years of age. He had been operated on at the age of forty-five for an enlarged prostate, and a perineal section had been done, without any relief to the patient, and he had a risidual of about six ounces at the time he was operated on. The diverticulum was situated just behind the right ureter;

one could pack two large pieces of gauze into this diverticulum, and it offered considerable trouble in removal. I simply report this case that was operated on by a general surgeon for obstruction at the neck of the bladder.

DR. ALEXANDER RANDALL, Philadelphia: I want to be able to verify what Dr. Keyes has just said as to the frequency of the occurrence of seed calculi. In my series of over 300 autopsy examinations I used to get the specimens before the bladder or urethra had been opened, and it was a frequent experience to find the posterior urethral walls so studded with these small calculi that it seemed as if someone had been along with a cinder-shaker. It was such a frequent observation that I began to keep account of the number of cases in which it occurred. They are generally situated in one of two localities, either just under the mucous membrane of the urethra, or else out under the prostatic capsule. They are usually darkly pigmented. On three different occasions I have had my attention called to their presence. First, when doing pathological work on specimens removed at operation, it was not unusual to find in a fair proportion of cases a scattering of such concretions when the specimen was sectioned. Again, while reading the excellent article of Wade (Edenburgh) in the *Annals of Surgery*, 1914, he made the remark that in at least one-third of his cases his microtome knife was injured by striking such concretions. And a third time, when Dr. Edward Martin, while talking with me about my post-mortem specimens, asked me how often I was finding "prostatic sympexia." The word was new to me, nor could I find it in the medical dictionaries. Dr. Keyes has just told me that he remembered the expression being used by his father.

While listening to Dr. Kretschmer's paper, I ran over my tabulations and find that in 184 specimens examined for sympexia they were found to be present in forty-four cases, or 23.8%. They vary in size from a mere dot to the size of a No. 8 shot. I have no doubt that many of the *x*-ray pictures shown by Dr. Kretschmer are from cases of true prostatic calculus formation, and that we are very apt to overlook just such cases, where sizable stones are present, unless we follow him and have routine examinations made; but on the other hand I am equally sure that some of his illustrations, especially where the shadows are more general and diffuse, are due to these seed calculi, or sympexia. Given such a case where the concretions are of small size, I have the gravest doubts as to whether they ever cause symptoms, and again equal doubts if operative removal would be possible at all,

for they are not pocketed nor of a size to be handled, except by a general curettage of the posterior urethra.

DR. V. D. LESPINASSE, Chicago: I would like to speak on prostatic stones in young individuals. As you all know, the prostate is relatively higher up in children than it is in adults, and this fact caused me to make this error in diagnosis. A little boy nine years old came complaining of pain, with a markedly distended bladder and leakage. I tried to sound him and got a click. Then we *x*-rayed him and had a shadow well above the symphysis. The shadow of the stone did not touch the symphysis at all; there was a distinct, clear line between the shadow and that of the symphysis. He also was complaining of severe pain in the rectum. But no rectal examination was made, as it seemed that the diagnosis was clear-cut that it was a stone in the bladder. On opening the bladder we passed the finger around and did not find the stone. So we went around again but did not find it that time. Then we opened the bladder up with retractors and looked down at the urethral orifice, and you could just see a little dark shadow in the urethral orifice. It enucleated in the same manner that you would enucleate a lobe of the prostate in suprapubic prostatectomy, and it left a cavity. The stone was about as large as the end of the last joint of my thumb. The boy went along and got well.

DR. WILLIAM F. BRAASCH, Rochester, Minn.: With reference to the *x*-ray diagnosis of prostatic calculi, it is said that the *x*-ray never lies, but if we were to believe everything that the radiogram tells us, we would get into much trouble. I believe we frequently see shadows similar to those that Dr. Kretschmer showed us which are not caused by prostatic calculi. That this is true is shown by the fact that we not infrequently see similar shadows, and similarly situated, in females. Secondly, I have seen similar shadows where the prostate has been previously removed. Thirdly, similar shadows are frequently seen where patients do not complain at all of any urinary symptoms, and where no evidence of enlargement of the prostate gland can be felt on rectal palpation, and on urethroscopic examination no evidence of prostatic calculi can be found. We should therefore interpret with caution all radiographic evidence which may appear in the prostatic area.

DR. W. B. DAKIN, Los Angeles: I wish to report four cases of prostatic calculi. I can recall four cases definitely, because they

were private cases; other cases I have had were charity cases and I do not remember them so well. These stones varied from two or three small ones, from the size of a pinhead to about the size of a lima bean, up to a dozen or more. The diagnosis was never made previous to operation. They were found at the time of enucleation of the prostate. I have always felt that there was some possibility of danger of injury in these cases where stones are present. I always feel that I might push them into the rectum and cause injury that way. I would like to ask Dr. Kretschmer if he has had any undesirable results in that way?

DR. BRANSFORD LEWIS, St. Louis: I understood Dr. Gardner to recommend particularly the transperitoneal method of operating on diverticulum. Now I would like to know if he does that methodically or finds it necessary. I have operated without opening the peritoneum at all. Then I would like to ask Dr. Kretschmer as to his recommendation in operating on prostatic caculi, whether suprapubic or perineal, in view of Dr. Keyes' remarks.

DR. KRETSCHMER: I wish Dr. Gardner would tell us how much reaction he had in his diverticulum cases. We have used the argentide and had a lot of pain and local reaction.

DR. GARDNER: Dr. Thomas has mentioned the finding of papilloma in the diverticulum. Those cases are very interesting, and are not infrequently found. In a case six or seven years ago I found bleeding in a man eighty-four years old, and the diagnosis showed a small diverticulum, and when removed, a papilloma was found which was reported benign by the pathologist. This man was from Memphis and had a summer residence in Buffalo, and when he again began to have trouble he went to see Dr. Schmidt, who found him practically in a dying condition. He did a suprapubic, and told me he found a bladder practically full of carcinoma. That was five years after I had seen him. I saw this man's family every summer, and they told me he had no symptoms. Dr. Schmidt informs me the man had practically no symptoms until a month or so before he died. The fact that the pat ologist reported a benign papilloma shows, however, that we are often misled.

Dr. Lewis asked about the transperitoneal method. I believe, if possible, the operation should be extraperitoneal.

With regard to argentide: I am very much interested in the case reported. When Parke, Davis & Co. first brought out the silver iodide we attempted to use it. I had somewhere gotten

the hint of making it up with quince juice. Then Parke, Davis brought out the silver iodide, suggesting its use 1 to 2000, which was not successful. After using it for a time I found that in strength of 1 to 30 it was efficient. Later Dr. Young of Boston suggested its use with quince juice in pyelograms, and from that time we began using argentide emulsion, not only in the kidney, but in bladder diverticula. In some of these cases we put in from eight to twelve ounces without a particle of reaction, but we have had two cases lately in which we used six or seven ounces and we have had a reaction for four or five days which was most severe, requiring morphine, etc. Parke, Davis & Co. had given us a large stock and it had stood in the office for some time. We thought possibly that it had changed in some way and become more irritating. Some of our patients had no reaction at all, but of late we have experienced a considerable of trouble.

DR. KRETSCHMER: In regard to the remarks of Dr. Thomas about the value of taking roentgenograms of the entire urinary tract, I wish to say that this is a part of our routine, and just in this way the cases were found in which there were no symptoms. I agree perfectly with Dr. Keyes when he says most of them are symptomless, and in going over the pictures, I brought out the fact that the patients came in with other troubles and prostatic calculi were found in the examination. That they are harmless, I doubt. In the first place, I called attention to the fact that the man who two years before I saw him had small shadows behind the symphysis, later developed large stones. I believe they become agglutinated and so may form large stones. I do not think they are harmless. The youngest patient I had was twenty-one. Dr. Townsend beat us by two.

Regarding Dr. Randall's remark that they are common, indeed they are common. I called attention to the fact that Gläsel, who thought he was able to review the literature carefully, was able to find fifty-odd cases. I found 167. They do occur frequently. One of the earlier roentgenologists who wrote on this subject took one hundred cadavers and rayed them for prostatic stones and obtained ten positive findings.

In regard to Dr. Braasch's remarks, I would like to add that all these patients were male. We have seen the shadows he has mentioned in female pelves. The roentgenologists tell us they have their origin in the broad ligaments, uterus, and ovaries.

In regard to Dr. Lewis' question, I believe I would prefer the perineal instead of the suprapubic route.

THE AMERICAN UROLOGICAL ASSOCIATION: A REVIEW.

PRESIDENTIAL ADDRESS BY
FREDERICK W. ROBBINS,
DETROIT, MICH.

When, on the evening of February 22, 1902, a motion offered by Follen Cabot, seconded by Ferd. C. Valentine, that the New York Genito-Urinary Society adjourn "sine die," was carried, the American Urological Society was born. It had no name and its mother was dead. The mother, more than two years of age, was of humble origin, having been born in a wine house, but was fortunate in having for her father no less a person than our well-known and beloved Ramon Guiteras. Sponsors on the occasion were Dr. Winfield Ayers, Dr. Bill Earl, Drs. Newell, Guiller, Fisher of Utica, and Blanchard (stenographer of clinic).

As this matter of birthplace is of much interest, let me quote in extenso from a recent letter from Dr. Guiteras:

"The 'Frei Robber' was a wine house on Ninth Avenue kept by a man named Hoffman, who made the wine in his cellar from grapes bought in the upper part of New York State. The wine was white and red, the former having the greater kick, and the latter the greater popularity. He also made a specialty of Limburger cheese, a product not so popular in our wicked city. The combination of the two, however, was very potent and was indulged in freely by the members of my clinic. The red wine was the

favorite. I discovered the place when walking down Ninth Avenue after doing a mastoid in that vicinity. The sign being enticing and the room in which we operated having been exceedingly warm, Dr. Fanoni and I sauntered into Hoffman's and cooled ourselves.

"On the next clinic day I told the members to wait, which they always did when there was a suspicion of anything liquid in sight.

"We boarded the 42d Street car and shot across town, all eyes turned to the left as we turned up Ninth Avenue, looking for the magic sign 'Frei Robber.' There was a grand cry as we spied the sign 'Frei Robber.' We filed in and seated ourselves. There was no one there but ourselves, the proprietor, and the Limburger; our strong ally, the Limburger, kept others away. After a few bottles of the red I proposed the formation of a medical society for our clinic, and that it be named the New York Genito-Urinary Society.

"The society was immediately organized and the stenographer sent out notices which, through the journals, were copied in remote places, in China, Japan, Greece, Asia Minor, and elsewhere."

The number of men who wanted to join was so great that very soon the idea of an exclusive body was given up."

Although it is well established on geneological authority that Guiteras is our grandfather it has not been recorded who the grandmother was, but from internal evidence it is quite certain that the New York Genito-Urinary Society was born of the spirit — not of the wine house, but of urological science and friendship there cemented.

The local interest in and rapid growth of the New York Genito-Urinary Society made a reorganization with a larger capitilization desirable. Therefore, Drs. Ramon Guiteras, Follen Cabot, Ferd. C. Valen-

tine, Winfield Ayers, Terry M. Townsend, C. L. Begg, F. W. Levisseur, M. A. Guillen, being present, the New York Genito-Urinary Society became an institution of the past, and the infant, now a strong body in its sixteenth year, began its career.

Dr. Ramon Guiteras was elected president and Ferd. C. Valentine secretary, both to serve two years. At the first meeting the names of seventeen others were added to those present as founders of the American Urological Association.

At the second meeting, held March 5th, 1902, it is interesting to note that Drs. Guiteras, Ayers, Von Glahn, Guillen, Mabie, Mallet, Otis, Porter, Saxe, Swinbourne, Townsend, Van der Poll, and Valentine participated in the discussions, and Drs. Stern and Goelet telephoned their regrets.

Meetings were held monthly, and on the third session, held in April, 1902, nineteen men were elected to membership, most of whom lived outside of New York. Included in this list are Paul Thorndike and Arthur T. Cabot of Boston, A. Ravogli of Cincinnati, Thomas E. Holland and J. T. Jelks, Hot Springs, and Frank Lydston and Denslow Lewis of Chicago. At the same meeting Dr. Valentine suggested an honorary membership and proposed a list of seven, who were elected.

At the May meeting the Pacific Coast became represented in the persons of Drs. Granville McGowan of Los Angeles, and Krotoszyma and Spencer of San Francisco.

The first annual meeting was held at Saratoga, June 13th, 1902. Dr. Hugh Young advocated the Bottini operation for prostatic hypertrophy, and Dr. A. H. Ferguson reported twenty-one cases treated by perineal prostatectomy. Dr. Valentine read a paper on "Failures in the Irrigation Treatment of Gonorrhœa."

At a later meeting Dr. Hugh Cabot, then secretary, speaking of twenty-two members who had paid dues, said "God knows how or when they got in, as there are no minutes of the fact." So at this, a large and enthusiastic meeting, we have been unable to find any record showing how a number of those present and taking part in the discussion became members. Probably the report of the executive committee which passed on applicants at that time was mislaid and not filed with the minutes.

Monthly meetings continued to be held in New York, usually at the Athletic Club, and men from all over the country were elected to membership on favorable report of the executive committee.

At the February meeting, 1903, a step in advance was made when an invitation, extended by Dr. McKnight, to hold the March meeting at Hartford was accepted, and a symposium on Tuberculosis of the Genito-Urinary Organs was participated in by Drs. Robert T. Morris, W. R. Otis, T. M. Townsend, and O. E. Gallant.

At the April meeting the society became much richer because of the addition to its membership of Drs. Chute, Wishard, and J. Rilus Eastman.

Two subjects that have been familiar to us ever since came up for discussion in October, 1903. First, Printing of Transactions. Second, Affiliation with the American Medical Association.

In a letter dated Sept. 2, 1903, we were asked to consider the advisability of affiliation with the A. M. A. It was stated that the A. U. A. would retain its name, autonomy, and independence. The only important change involved would be a provision that no one not a member of the A. M. A. could be a member of the A. U. A., which would be entitled to a representative in the House of Deligates. Two months later Drs. Hugh Cabot, George S. Whiteside,

and R. F. O'Neil joined the society, and Dr. Lower in April, 1904, at which time, in response to a telegram from Wm. L. Baum, the Chicago Urological Society became a branch of the A. U. A.

Little is noted regarding the second annual meeting at New Orleans, or of the third at Atlantic City, but following this third annual meeting there appear to have been no more regular meetings of the A. U. A. in New York, for the next note in the minutes is of the Portland, Oregon, meeting, July 12th, 1905, at which time a large number were added to membership from the coast states and section six was formed to include the states of California, Oregon, Washington, Idaho, Arizona, Nevada, and New Mexico.

At Boston, 1906, were read resolutions on the death of Dr. Max Nitze, drawn by Drs. Follen Cabot, Richard O'Neil, and W. K. Otis. At the same meeting, for the first time a representative from the Dominion of Canada was placed on the nominating committee. At Atlantic City, 1907, an important motion was made by Dr. Hugh H. Young and carried, that the executive committee be ordered to discontinue relations with the Grafton Press, since which time the transactions have come to us in the present very satisfactory form. At that session the Constitution and By-Laws under which we have worked for ten years were adopted.

It was here settled that in a city in which a branch exists a man may become a member of the A. U. A. by becoming a member of the branch, and may become a member only through a branch.

Two applicants were rejected (homœopathists) because not regular practitioners of medicine.

Nothing of great interest developed in 1908, but what seemed at the time a most momentous matter came up at Atlantic City in 1909, viz., affiliation with the A. M. A. It seemed that we must succumb.

For a time arguments were strongly urged for and against affiliation. The A. M. A. had power to establish a section of Genito-Urinary Disease, and had decided to do so in any event.

I love to go back in memory to that afternoon and recall the figure of Ferd. Valentine as for the last time he stood before us fighting for the organization which he loved. We little thought then that we were listening to him for the last time.

I do not know that others felt as I did that afternoon. I did not appreciate then as I do now the solid fundation on which we are built, but in view of all the facts that we then possessed it was very difficult to foresee the establishment of a successful section of the A. M. A. and at the same time an American Urological Association gaining steadily in both members and power.

When Dr. Lydston at last got to his feet and moved that "the American Urological Association is opposed to amalgamation with the American Medical Association," and we all supported him, it appeared to me that the spirit of friendship which we inherited had not forsaken us. It would not allow our amalgamation with another body, but did cement very strongly our own organization. Immediately we looked with hope to the future, and soon became convinced that the foundation of this association was so broad and its roots so deep that other organizations were its allies; not enemies, but healthy rivals.

At St. Louis in 1910 we met for the last time with the American Medical Association and for the last time voted unanimously against amalgamation with that body. At this meeting, for the first time, we missed the one figure that had never been absent, Ferd. C. Valentine. It was not only the personality that was missed; the American Urological Association in the death of Dr. Valentine had lost an integral

part of itself. His interests were so bound up with the interests of this association that we could not think of the man without thinking of the A. U. A., or of the association without the man. Dr. Valentine was not an ordinary man. He did not do things in a conventional way. He had his critics and many strong friends. Those that knew him best appreciated him the most. He loved his science. He had a great, generous heart. When his friends, Drs. W. N. Wishard and Granville MacGowan, wrote that beautiful tribute to him which is to be found spread on the minutes of this association, they voiced the sorrows and sympathy of those especially who had been admitted to some extent to the inner recesses of his life.

The winter following the St. Louis meeting President Dr. Hugh Cabot sent out return postals asking opinions of members concerning the By-Law requiring the annual meeting to be held at the time and place of the meeting of the A. M. A. He received one hundred and twenty-five replies. Of these, one hundred and nine favored a change in the By-Laws. Accordingly the By-Laws were suspended and the 1911 session was held at Chicago in September.

I find, aside from the excellent scientific sessions and splendid entertainment given us by our Chicago friends, only two matters of interest, viz., the election to membership of Dr. H. L. Sanford. I believe an introduction to our efficient secretary is not necessary.

On the recommendation of Victor C. Pedersen action was taken regarding prize essays. Has any one claimed the honors?

Dr. Geraghty came to us in 1912.

The Philadelphia Genito-Urinary Society and the Detroit Urological Society became branches of the A. U. A. in 1914, thus adding fifty names to the membership roll.

So much for the machine as it has been developed during the first fifteen years of its life. The machine is useless without motive power, and the value of machine and motive power is only measured by accomplishment.

The spirit of friendship developed among any class of workers is of great value. We cannot measure it, but I believe that in the American Urological Association there is not a soul so dead that he does not often feel it, and finds his life influenced by it.

More tangible is the evidence of work done by members of this body. All have gotten benefit from this work, but of course those doing the most work have gained most. Excluding work done by the various branches, 375 papers have been read by 152 different authors, and many others have been offered which could not be accepted without overloading the annual program.

It interested me to see the names of our most prolific workers. Bransford Lewis leads, with eleven papers to his credit. His work, as that of a few others to be mentioned, includes papers written by the combined efforts of more than one author. Nine papers by Edward L. Keyes. Eight papers by L. E. Schmidt, Francis Hafner, Arthur L. Chute, Paul M. Pitcher, V. C. Pedersen, H. L. Kretschmer. Seven by A. Ravogli. Six by George K. Swinbourne, C. E. Barnett, J. A. Hawkins, C. G. Cumston. Five by Ferd. C. Valentine, A. L. Wolbarst, Eugene Fuller, C. M. Harpster, J. H. Cunningham, Granville MacGowan, and Hugh H. Young. Four each by J. D. Barney, H. A. Fowler, I. S. Koll, Hugh Cabot, L. W. Bremerman, M. Krotoszyner, Winfield Ayers, Louis Heitzman, E. G. Mark, O. C. Smith, Terry M. Townsend, Heinrich Stern, and William T. Belfield.

These papers have been read at annual meetings held at: Saratoga, once; New Orleans, once; Atlantic

City, thrice; Portland, Oregon, once; Boston, twice; Chicago, twice; St. Louis, twice; New York, once; Philadelphia, once; Baltimore, once.

In the moments still at my disposal may I call attention to a few of the points differentiating us from other organizations.

In the first place we are an organized body. We can limit our membership as we will. As a result there is in our body a spirit of fraternity that does not and cannot be found in the American Medical Association. "The membership of this association shall be composed of those whose scientific work contributes to the progress of this branch of medical science." So reads Section 1, Article 2, of our Constitution. As a result we are enriched by the presence of many leaders in surgery and gynæcology who are contributing much to the science of Urology as well as to their own special line of work. These men would not be found in the section of Genito-Urinary Diseases of the A. M. A., and probably not in the limited society of Genito-Urinary Surgeons.

This association is a large body, sufficiently so to ensure an enthusiastic meeting wherever in the country it may be held. This fact lends impulse to those reading papers to do their best. All will agree with me that the many attractions found at the great national meetings add to our interest in the work of the association and increase the pleasure and value of social relations.

Under the Constitution it is not at all obligatory for a would-be member to limit himself to the practice of urology. As a result we have with us, and gladly, many men from all over the country, interested to a large extent in our specialty, although not limited in the full sense to its practice. On the other hand, as a result of the influence of branches established in New York, New England, Philadelphia, Detroit,

and Chicago, membership, coming as it must through the branches, is in such centers becoming more and more limited to those largely engaged in urological work. In Detroit we are finding the branch of considerable value. It would seem worth while in centers large enough to support them — and such centers do not have to be very large — to establish branches more generally. The interest in urology is thereby stimulated and standards of membership in the Urological Association elevated. Now that a section on Genito-Urinary Diseases exists in the A. M. A. no hardship is worked on any man because the association, or any branch thereof, decides that a candidate is professionally or socially not up to standard.

It may be remembered, but like a man's love for his family not always spoken of, that to the annual meeting of the American Urological Association is brought the spirit of scientific desire linked with the friendship introduced by our founders. This combination has produced the strong organization which has steadily grown. We congratulate ourselves upon the position she occupies among scientific societies in America to-day and bespeak for her a future of growing usefulness.

In closing, what may I say to you gentlemen who last year honored me far beyond my deserts in making me your president? When I think, one by one, of those at whose feet we have been honored to sit, at the tap of whose gavel we have been accustomed to obey, men who have guided the association from its beginning to the high place it now occupies, I fully realize that there are many others among us who have more richly deserved this honor.

Though yielding to no man in loyalty to the American Urological Association, the thought that no commensurate return can be made for your friendship,

which has expressed itself in giving me the best you have to give in elevating me to this honorable position, enriches the gift.

The friends that I have made in this association are among my most precious possessions, and for these friendships and this honor, with all humility I thank and shall always remember you.

A STUDY OF CHEMICAL BLOOD FINDINGS IN VARIOUS CONDITIONS, IN COMPARISON WITH THE PHENOLSULPHONEPHTHALEIN OUTPUT.

R. B. H. GRADWOHL AND H. J. SCHERCK,
ST. LOUIS, MO.

We wish to present the results of an investigation regarding the comparative usefulness of the new blood chemical methods and the usual urine tests, together with the estimation of the phenolsulphonephthalein output. This investigation was designed with one principal object in view, namely, to show whether or not these new blood tests will give to the practical surgeon any more information than is obtained by (a) routine urinary examinations and (b) estimation of the quantity of phenolsulphonephthalein excreted.

It might be well at the outset to review some of the main points concerning non-protein nitrogenous metabolism before entering upon a discussion of their exact application in this special study. These methods which are largely colorimetric owe their inception into the domain of the clinical laboratory to the efforts of Folin, Benedict, Meyers, and Fine. These methods have in the main practically superseded the older methods of blood chemical analysis which were in vogue for some years in biological chemical laboratories. The advantage of making these newer tests over the older tests is that they require but a small quantity of blood, and that they can be rather rapidly carried out in well-equipped diagnostic laboratories.

The ingredients which are ordinarily searched for in order to determine kidney function are: uric acid, urea nitrogen, creatinine, and sugar. We have not included cholesterol because its clinical importance has not yet been scientifically determined. It might be well to state at this point the normal concentrations of these various ingredients in blood. This will be found covered in Chart I.

CHART I.

DISEASE	Urea N.	Uric Acid	Creatinine	Sugar	CO_2 Combining Power of Plasma	Phenolsulphonephthalein
	Mgms. per 100 c.c. of Blood			Per cent	Per cent	Per cent
Normal	12–15	1–3	1–2.5	0.08–0.12	53–77	60–85
Chronic Nephritis	15–50	1–4	1–3	.....	53–40	52–0
Uræmic Nephritis	80–300	4–15	4–34	0.10–0.20	40–20	10–0
Diabetes	.....	....	.....	0.15–1.10	50–20	.....

The normal amount of urea nitrogen in blood is 12 to 15 mgs. per 100 c.c. of blood; of uric acid, 1–3 mgs.; of creatinine, 1 to 2.5. The percentage of sugar normally present in blood is 0.08 to 0.12. The next column in the chart shows the volume per cent of CO_2 combining power of plasma, which is normally from 53 to 77. This means that under normal conditions blood plasma will take up from 53 to 77 of the combined carbon dioxide that is blown into it. We determine this by means of the Van Slyke method, which by the way is one of the best tests of acidosis. When conditions of acidosis supervene, the combining power drops to 50 and below. The normal elimination of phenolsulphonephthalein in two hours is from 60 to 85 per cent, according to Geraghty and Rowntree's figures.

Chart I also gives figures found under abnormal conditions. For instance, in chronic nephritis we may have an increase in the concentration of the urea nitrogen of from 15 to 50 mgs.; of uric acid

from 1 to 4; of creatinine, 1 to 3. In that condition of severe nephritis which is called uræmic nephritis, we may have an increase of urea nitrogen of from 80 to 100; of uric acid from 4 to 15, and of creatinine from 4 to 34. There is also a slight rise of blood sugar in this condition, and likewise a drop in the carbon dioxide combining power down to as low as 20. The phenolsulphonephthalein output is also low in uræmic nephritis, down to as low a point as to 10 and even 0. The chart shows too that in diabetes the blood sugar increases anywhere from 0.15 to even as much as 1.10 per cent, which latter figure is the highest recorded increase of blood sugar.

Chart II shows a more elaborate picture of the characteristic blood conditions than that just described. This table gives in addition to those already catalogued the amount of total solids, total nitrogen, non-protein nitrogen, creatinine, chlorides as sodium chloride, and cholesterol.

It has been determined by numerous investigations that the first change that occurs in debilitated kidney functions is an accumulation of uric acid in the blood. In other words, the first ingredient to be stored up in blood when kidney begins to show deficient elimination of phenolsulphonephthalein is uric acid. This is manifestly due to the fact that uric acid of all the blood ingredients is the most difficult for the kidney to get rid of. It follows that when an organ is disturbed in function, the ingredient which is the most difficult to handle is the first one to be dammed up. As the functional activity of the kidney continues to be weakened, urea nitrogen becomes stored up in the blood.

The last ingredient to be stored up—and this occurs in severe cases — is creatinine. Creatinine is the easiest ingredient for the kidney to eliminate, therefore it is the last one to be blocked. The order of

CHART II.

THE CHARACTERISTIC BLOOD PICTURES IN GOUT, DIABETES, AND NEPHRITIS.

DISEASE	Total Solids	Total Nitrogen	Non-Protein Nitrogen	Urea Nitrogen	Uric Acid	Creatinine	Creatine	Sugar	Chlorides as Sodium Chloride	Cholesterol
	Per Cent		Mgms. per 100 c.c. Blood					Per Cent		
Normal	20.0	3.00	25–30	12–15	1–3	1–2.5	5–10	0.08–0.12	0.65	0.15
Gout					3.5–6					
Mild Diabetes								0.15–0.30		
Severe Diabetes	17–20	1.8–2.9						0.30–1.10	0.57–0.61	0.15–0.30
Chronic Nephritis	13–19		30–80	15–50	1–4	1–3			0.54–0.75	0.17–0.35
Uræmic Nephritis	12–18	1.7–2.7	120–350	80–300	4–15	4–34	5–31	0.10–0.20	0.48–0.64	0.17–0.35

accumulation of these ingredients in blood in kidney disease is consequently uric acid, urea nitrogen, and lastly creatinine. The accumulation in this order has been well described by Myers and Chase under the description of the "staircase" accumulation of the non-protein nitrogenous constituents. We would expect therefore in the beginning of kidney derangement to find only an increase of the uric acid. If the case was moderately advanced we would expect to find also an increase of urea nitrogen present. If the case is far advanced, we would expect an increase of uric acid, urea nitrogen, and also creatinine. An increase of creatinine therefore portends disaster, so that when the concentration of creatinine is in the neighborhood of 5 mgs. or over we are warranted, according to all recorded experiences, in making a fatal prognosis. The finding of over 5 mgs. of creatinine per 100 c.c. of blood has always been followed by death of the patient within one to two months after the accumulation has progressed to that extent. This observation has been repeatedly made by one of us (Gradwohl) in a variety of conditions, principally in connection with studies at the City Hospital on cases of chronic interstitial nephritis. In the summer of 1916 a group of cases of thermic fever was studied also by Dr. Schisler and one of us (Gradwohl) in which particular attention was paid to the creatinine content of the blood with respect to prognosis. In no case did the blood chemical analysis run counter to the ultimate fate of the case although in one instance at least the clinical symptoms appeared favorable in the presence of more than the fatal quantity of creatinine; the individual died, however, thus confirming the great prognostic value of this finding. It is to be noted that some cases of nephritis, particularly those corresponding to what the anatomist chooses to dignify as chronic parenchymatous nephritis, may be on the

CHART III. — THERMIC FEVER, BLOOD AND URINE.

BLOOD ANALYSIS								URINE ANALYSIS							
CASE	Date 1916	Outcome	Urea Nitrogen	Uric Acid	Creatinine	Sugar	Remarks	Specific Gravity	Albumin	Sugar	Acetone	Diacetic Acid	Indican	Microscopical Examination	Remarks
			Mgms. per 100 c.c.			Per ct.									
O'Conner	8/1	Died	33	1.32	4.80	1.50	Retention high. Patient died same day.	1015	††	Neg.	Neg.	Neg.	††	Moderate number of coarsely granular casts and red blood cells. Occasional leucocytes.	Findings serious.
Fischer	8/2		32	8.6	4.1	0.162	High retention indicating probable fatal outcome. Patient died two days after creatinine reached 5.0 mgms. per 100 c.c.		††	Neg.	††	††	††	Moderate number of granular casts and epithelial cells.	Urinary findings indicatedsome marked renal disturbance, but not same importance as blood findings.
	8/3	Died	39	9.8	4.56	0.165									
	8/4	Died	39	7.9	4.47	0.180									
	8/8		45	7.1	3.94	0.150			Neg.	Neg.	Neg.	Neg.	Trace	Moderate number of epithelial cells, leucocytes, and finely granular casts.	
	Spinal Fluid 8/8		44	0.88	2.4	0.10									
	8/10		55	6.9	5.0	0.174									
	8/12		89	11.2	5.0	0.20			Neg.	Neg.	Neg.	Neg.	†††	Very many granular casts and occasional leucocytes. Such number of casts is rarely seen.	Remarkable number of casts on last day of life.

Huth	8/2	Recovered	26	9.6	3.83	0.168	Retention not high. Patient recovered although clinical signs seemed bad.		††	Neg.	††	†	††	Moderate number of coarsely and finely granular casts and occasional leucocytes. Very occasional leucocyte.	
	8/12		14	3.3	2.0	0.120			Neg.	Neg.	Neg.	Neg.	Neg.		
Ship	8/3	Died	76	14.8	6.1	0.177	Clinical signs good. Retention high, attracting attention to fatal prognosis. Died one day later.		Very Faint Trace	Neg.	Neg.	Neg.	††	Moderate number of epithelial cells and leucocytes. Very occasional red blood cells. Two finely granular casts found after a prolonged search.	
Muich	8/4	Recovered	19	3.3	3.0	0.B8	Observation made when convalescent								

§ ††† Very large amount.
†† Moderate amount.
† Small amount.

very last lap of life, with exitus lethalis close at hand, and yet the creatinine does not necessarily exceed 3.0 or 4.0 mgs. Its prognostic value therefore is only valuable when it is high. A low creatinine content naturally does not exclude the possibility of impending death. The chart which we present here (Chart III) gives the blood and urinary findings in this group of cases of thermic fever. The condition so far as the kidney function is concerned closely simulates uræmia.

The material for this study of the comparison between blood chemical findings and the phenolsulphonephthalein test consisted in the main of obstructive conditions of the lower urinary tract in which there was more or less back pressure on the kidneys. Some of these cases suffered from nephritis as well.

It has always seemed more plausible to expect more important information from chemical studies of this kind rather than from the power of the kidney to eliminate an inert dyestuff such as phenolsulphonephthalein. We assume that the cause of the severe symptoms in nephritis is impending or advancing uræmia and that the cause of the uræmia is resident in deficient elimination through the kidneys. Whether the ingredients in blood which we are analysing represent the substances themselves that produce the toxic symptoms or whether they are simply an index of the toxic state, is beside the point for the purpose in hand. We believed from our studies on internal medical problems that the blood chemical methods on this, a most important surgical problem, would serve us in good stead. The estimation of kidney function by the determination of the ease and speed with which a chemical dye can be eliminated through them seems somewhat rash in theory and in practice. Because a dye-stuff is eliminated with a certain degree of ease, it does not follow that

the by-products of metabolism are similarly passed out through such kidneys. In referring to chemical dye-stuff tests, we allude more particularly to the test of Geraghty and Rowntree, for of all the color-producing substances that are used in kidney functional work, this is the most commonly used and quoted because of its ease of administration, its harmlessness, and the rapidity of testing for its presence in voided or catheterized urine. Within certain limitations it gives a fairly good picture of kidney function, still it manifestly cannot give the observer the same intimate picture of metabolic processes and real kidney efficiency or deficiency which goes with a complete blood chemical analysis. The work of Folin, Fitz, Frothingham, and Denis on "The Relation Between Non-Protein Nitrogen Retention and Phenolsulphonephthalein Excretion in Experimental Uranium Nephritis," gives a very good view of the exact value of each method of investigation from a purely experimental standpoint. These experiments showed that there was a wide difference in the figures of the phthalein test and the blood chemical data; that at the beginning of the nephritis, the phenolsulphonephthalein elimination dropped more rapidly than the accumulation of non-protein nitrogen and urea of the blood. During the course of the disease the height of the nitrogenous accumulation is reached from two to three days later than the lowest level of the phenolsulphonephthalein excretion. Non-protein nitrogen and urea accumulated in the blood and returned to normal gradually, in these rabbits, as recovery of the kidney occurred. These observers maintained that in general these two tests paralleled each other, but with this essential difference: the amount of phenolsulphonephthalein excretion showed the kidney function at the moment; the amount of non-protein nitrogen and urea in the blood is rather a measure of an

accumulating difference between the amounts of waste nitrogen produced in the metabolism and the amounts eliminated by the kidneys. The time element, the duration of the condition, constitutes therefore a most important factor in the comparison of these two tests. The phenolsulphonephthalein test indicates the function for the *moment*, the blood chemical tests indicate the true *grade* of the working power of the kidneys. These experiments upon rabbits represent the earliest definite comparative tests of these two methods. The conclusions of Folin and his collaborators have been well borne out in practice. We know that there are many cases with little or no phenolsulphonephthalein excretion that are badly deficient and show high retention of these non-protein nitrogenous blood constituents; we know also that there are some cases with decreased phenolsulphonephthalein output that are functionating quite well, viewed in the light of the non-retention of these ingredients of blood; we also know that there may be a normal phenolsulphonephthalein output and a marked retention of the blood constituents. These three sets of conditions would therefore make us pause in accepting alone the evidences of kidney function from the phenolsulphonephthalein test alone. Our personal experiences with a comparison of the two methods have forced us to the conclusion that the estimation of kidney function in so far as it interests the urologist cannot be intelligently viewed from the standpoint of operative risk without a survey of the percentage of these blood constituents as well as the phenolsulphonephthalein test.

A study of Chart IV gives the detailed results of the blood chemical and phthalein investigations on the series of urological cases which we selected for this work. A study of these figures gives some very interesting facts. In the first place, Case I, of stricture

CHART IV.

COMPARISON OF BLOOD CHEMICAL FINDINGS AND PHENOLSULPHONEPHTHALEIN EXCRETION.

				BLOOD				URINE		PHTHALEIN EXCRETION	
No.	Name	Date	Outcome	UreaN	Uric Acid	Creatinine	Sugar	Albumin *	Casts	Phthalein 2-hour Output	Remarks
				Mgs. per 100 c.c.			Per Cent				
1	D. I.	1/25/17		44	6.5	3.93	0.120	†	—	None	Nephritis. Stricture. Sepsis.
2	D. I.	1/27/17		50	4.9	4.39	0.118	—	—	20	
3	D. I.	2/ 2/17		63	4.0	4.00	0.171	—	—	Trace	
4	D. I.	2/ 9/17	Died	55	4.9	3.85	0.144	—	—	Trace	
5	R. C.	1/26/17	Died	20	4.1	1.93	0.118	—	—	41	Cancer of Prostate.
6	C. S.	2/ 2/17	Improved	12	2.5	1.05	0.117	††	Granular	37	Enlargement of Prostate.
7	A. E.	2/ 2/17	Improved	12	2.7	1.08	0.090	††	Granular	27	Enlargement of Prostate.
8	D. B.	2/ 9/17	Improved	31	3.1	1.97	0.126	†††		31	Paraphimosis.
9	G. W.	1/14/17	Improved	16	2.6	1.15	0.120	—	—	60	Stricture of Urethra.
10	J. E.	2/14/17	Died	135	9.9	5.00	0.200	Bloody	Bloody	None	Chronic Int. Nephritis and Hyper Prostate.
11	P. K.	2/23/17	Improved	12	2.5	1.20	0.118	—	—	65	Phimosis.
12	O. M.	2/24/17	Unimproved	15	2.4	2.06	0.108	—	—	22	Stricture of Urethra.
13	H. H.	2/24/17		12	2.9	2.06	0.111	—	—	47	Enlarged Prostate. Trabeculated Bladder.
14	R. W.	2/28/17	Improved	11	2.7	1.25	0.105	—	—	69	Stricture of Urethra.
15	R. W.	3/21/17		9	2.6	1.16	0.090	—	—	60	Enlarged Prostate.
16	C. W.	2/28/17	Improved	25	5.9	1.62	0.114	—	—	None	Stricture of Urethra.
17	J. C.	2/28/17	Improved	13	5.7	1.25	0.108	—	—	40	Hernia.
18	J. K.	2/28/17	Improved	18	2.0	1.62	0.108	—	—	31	Trabeculated Bladder. Tabes?
19	H. K.	3/ 2/17	Improved	11	3.3	1.16	0.102	—	—	47	Stricture of Urethra.
20	A. B.	3/ 2/17	Improved	18	2.5	1.70	0.156	—	—	22	Retention of Urine.
21	M. K.	3/ 7/17	Not operated	16	3.4	2.15	0.114	—	—	Trace	Enlargement of Prostate.
22	L. M.	3/ 7/17	Improved	14	3.5	1.16	0.114	—	—		Enlargement of Prostate.
23	J. D.	3/ 8/17	Operated	12	2.5	1.25	0.120	—	—	50	Enlargement of Prostate.
24	W. M.	3/ 8/17	Improved	12	1.2	1.13	0.117	—	—	48	Ischio Rectal Abcess.
25	A. H.	3/21/17	Improved	15	4.4	1.52	0.096	—	—	21	Enlargement of Prostate.

* † Small amount.
†† Moderate amount.
††† Large amount.

of the urethra, at the time of the first examination, gave absolutely no evidence from a clinical or urinary standpoint, of any disturbance in the kidneys. Nevertheless, when we found 44 mgs. of urea-nitrogen, 6.5 uric acid, 3.93 creatinine, we immediately made a serious prognosis, regardless of the fact that this patient at this time was up and about the hospital wards, apparently in good condition. Within forty-eight hours this patient went into uræmia, at which time his blood findings were urea-nitrogen 50, uric acid 4.9, creatinine 4.39. At this time a fatal prognosis was made. A few days later, another examination showed more increase of all the ingredients except creatinine. It is also to be noted that at the time of the first examination the phthalein excretion was nil. At the time of the second examination, with clinical symptoms worse, with blood chemical findings worse, there was an improvement in the phthalein output. Then there was a drop in the phthalein output. It might be added that this patient died six weeks after the time of the second examination. In this case the blood chemistry showed the true condition of the patient where clinical signs and urinary examination did not. Phenolsulphonephthalein elimination also improved in this case, although the patient became worse.

A survey of the complete figures of other cases here, shows that there were a number of instances, particularly in prostatic cases, where the blood chemical findings were normal and the phthalein elimination very much decreased. In these cases the phthalein output was disregarded in surveying operative risk, the patient was operated and in each case on the blood chemical findings, the convalescence was in no manner unusual or disturbed by any thought of kidney insufficiency such as was indicated by the diminished phthalein output.

We have records here showing extensive changes in kidneys without urinary change, without change in the phthalein output, and yet with very definite retention of urea, uric acid, and creatinine. We have other data showing that in the presence of a rather low phthalein output, kidney function may be unimpaired so far as retention of the non-protein nitrogenous constituents is concerned. The points which we wish to emphasize, from our investigations with blood chemical methods as bearing upon the specialty of surgical urology, do not vary much from the conclusions that interest the internists, namely, that the estimation of kidney function after all is entirely a matter of computation of a number of factors and that the phenolsulphonephthalein test occupies a subordinate position, even when positive, and then it is of much more importance than when negative. In other words, as recently pointed out by Beer, "The good excretion of test substances usually means a good function. Occasionally hyperfunction, however, may accompany severe diseases and may be very misleading." Foster called attention to the high figures of phthalein output in persons dying with uræmia. Unfortunately, the investigators who have worked with these various methods, have failed to make sufficiently searching researches upon all the important blood constituents which we are embracing in our present work. We have some cases with mechanical obstruction to the outflow of urine, candidates for operation, with practically normal concentrations of uric acid, urea nitrogen, creatinine, and sugar, and yet with very low phthalein outputs. These cases according to our view in no way were in a state of disordered kidney function. We have one record of a case of marked stricture with no discoverable physical signs of kidney change, which showed high concentration of these ingredients, including crea-

tinine, figures pointing to an impending uræmia, even though the clinical condition of the patient at the time of the first blood test was extremely good. Later on, true to the prediction of the blood findings, this patient lapsed into uræmia and dissolution occurred.

The blood chemical analysis tells us what the blood is storing up, what the kidneys are doing and what they are *not* doing, and also the exact status of nitrogenous and carbohydrate equilibrium.

We must insist in emphatically denying that the estimation of the presence and percentage of albumin in urine and even the findings of cast indicate the true condition of the kidney function. Kidney disease and kidney function are not synonymous by any means.

From our experience in this work we believe blood chemical analyses to be a valuable addition to our laboratory methods.

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DISCUSSION

OF PAPER OF DRS. GRADWOHL AND SCHERCK.

DR. GILBERT J. THOMAS, Minneapolis: I think Drs. Scherck and Gradwohl have emphasized an important point relating to the estimation of renal function. In a study of more than two hundred cases of surgical conditions in the kidney, Dr. Braasch and I demonstrated that the phenolsulphonephthalein test is not always as reliable as it is claimed to be, but I think the error lies in considering these tests as final. Such a laboratory test should be regarded as nothing more than confirmatory evidence. It is quite necessary in the study of the function of the kidney to investigate it from the standpoint of the blood urea, nitrogen, and creatinin. Dr. Gradwohl's emphasis on creatinin is important.

DR. B. A. THOMAS, Philadelphia: I would like to confirm what Dr. Gradwohl and Dr. Scherck have said in regard to the value of functional kidney tests in determining the operability of certain patients. It is a well-known fact, in prostatectomy, that the commonest cause of death is kidney insufficiency—uremia. Incidentally, it might be said that very frequently in the hands of general surgeons many of the cases are put down as having died of hypostatic pneumonia, cardiac failure, etc., when, as a matter of fact, the primary or fundamental cause is kidney insufficiency. Therefore, in view of the fact that the major portion of the death rate is referable to kidney insufficiency, considerable attention should be paid to that function before operating these patients.

There seems to be gathering in the minds of many in the last year or two the thought that the functional tests are not of the value they were thought to be a few years ago. I am not in accord with this belief. I would also like to state that I believe if more attention were paid to renal functional tests naturally, in addition to other qualifications, as the cardiovascular condition, the blood pressure, and various other vital forces of the patient, we would be able to shave the present low mortality rate for operations directed to the kidney and prostate.

I would also like to make a plea, in view of its omission by Drs. Scherck and Gradwohl, for indigocarmin. I still entertain the same love for the royal blue as formerly. I appreciate the value of the phthalein and various other tests, and for the last

two years, in cases where it has been possible and the condition of the patient warranted the application of several tests, we have carried out no less than ten in many instances. The results of this study will be reported in June. In brief, it may be stated that the results of this study to date indicate that there is none superior to indigocarmin. The explanation for loss of some of its popularity I think is largely due to the fact that at present it is necessary to use a rather expensive colorimeter, whereas other cheaper colorimeters have been advertised and recommended for phenolsulphonephthalein. There are some undeniable advantages which indigocarmin possesses over phenolsulphonephthalein as a kidney test, which need not be recounted at this time.

There is one feature connected with the quantitative employment of indigocarmin that in my experience has placed its reliability without a peer, and that is its *index of elimination*. I believe the index of elimination shows the stability of the kidney function — and that is the all-important consideration — more accurately than the mere quantitative output for the first two hours, particularly if the time required for the drug to appear is ignored. The index of elimination, which is the ratio between the amounts eliminated in the first and third hours, will, I believe, demonstrate the stability of renal function, observing as it does in damaged kidneys the delay in onset of the dye, therefore the decreased amount for the first hour from the time of injection and the relative increased output of the third hour. Thus, when the elimination in the third hour exceeds that for the first, the patient is said to be in the negative phase, and operation is contraindicated. On the other hand, when the amount for the first hour exceeds that for the third, the patient is in the positive phase, and should be a good operative risk. Many surgeons feel to-day that the two-stage prostatectomy will obviate the necessity of kidney tests in many instances. So it will. But it is impossible for any clinician to determine with the precision offered by functional renal tests, the exact day of early safe operation. Thus the patient, after a primary suprapubic cystotomy is often kept in the hospital for a few days or a week or two longer than necessary, in order to assure doubly, as it were, his recovery after prostatectomy. Some of us contend that the competent employment of functional kidney tests will enable us to determine the *safe operable* day at the *earliest possible* date. Moreover, we believe it is a matter of some importance, financially, commercially, and socially, to many patients, to curtail their hospital sojourn to a minimum.

DR. M. LAUTERMAN, Montreal: I only want to make one or two observations with reference to this work in general. I think that we, as surgeons, have to acknowledge the deep obligation and debt of gratitude that we owe to the laboratory worker. Order seems coming out of chaos at last, and while I am free to confess that a great deal of the work that is being done to-day appears superfluous and may not be lasting, the fact nevertheless remains that we have made genuine progress in this department of our work. Personally, I feel that to the surgeon the phenolsulphonephthalein test is most important. I am not disposed to attach the same degree of importance to the estimation of the blood urea and the other features that have been brought to our notice. I believe that they are of more importance to the internist than they are to the operating surgeon. But I believe that this is a field that we should all make it our business to become thoroughly familiar with, because I still believe that we cannot possibly have too much information when attempting to accurately estimate the risk that we are asking our patients to assume before subjecting them to the crucial test of surgical interference. As I said before, to me it is not only a pleasure and a privilege, but I believe it our duty to encourage as much as possible the gentlemen who have undertaken to blaze this trail for us on a hitherto unbeaten path.

DR. LOUIS E. SCHMIDT, Chicago: I think there is sufficient evidence up to the present time to take notice of these blood examinations, particularly in connection with operative work. It is true that this matter may be of great interest to the internist, but I think it is more important at the present time to the surgeon. From a careful review of the literature, I am inclined to believe things have been borne out as Dr. Gradwohl has presented; that when you find that the retention is high in the blood, the prognosis is unusually bad. I have had comparatively little experience, but sufficient, I believe, to express an opinion on this subject.

I wish to refer to cryoscopy in connection with this subject which was done years ago by a great many of us. I might say that I still continue to do cryscopy of the blood. I considered cryoscopy of the blood of value years ago, and I am now under the impression more than ever that is it of some value, particularly where it is now understood that the retention of certain products in the blood is unquestionably an index as to the prognosis or prospects of the patient. I am quite sure that if the

blood freezes, we will say, at a lower degree — that is 0.59 or -0.60 C., which is comparatively high — that in these cases we also find that there is a pronounced retention of urea and creatinin. I am inclined to believe that where this test is simple and can be carried out quickly it should not be thrown aside. It has given me some information, and it is true that I do not consider the results of cryoscopy of the blood in any different way than I would the estimation of phthalein sugar or indigocarmin in the urine. Any single individual contraindication, so called — for instance, a low output of phthalein in the urine — certainly does not contraindicate any operative interference if the clinical symptoms demand it. The same holds true with cryoscopy.

DR. SCHERCK: I was going to make the same point that Dr. Schmidt made in answer to Dr. Lauterman. If it is of interest to the internist, it is surely of interest to the surgeon, because if a case is a bad risk from the internal medical standpoint, it is a bad risk from a surgical standpoint. Our work was done in an effort to try from our material and opportunity to see just what there was to it, combining the theoretical and laboratory methods with the actual cases on the service, and our impression at the end of our work was to the effect that it was of decided value. So this paper was prepared in order to encourage further investigation on the part of the members of this Association. Of course, it goes without saying that all other methods, laboratory and clinical, in the estimation for operative risk are not to be decried. This is only an additional routine in up-to-date hospital efficiency. Nor do we mean to say that the phenolsulphonephthalein test in some cases did not parallel our blood tests. But in many there was a great discrepancy. We think blood chemistry is important, in fact more important than the phthalein test.

DR. GRADWOHL: While this work was originally brought out for the purpose of assisting in the problems of internal medicine, it appealed to me at once as being possibly of more real service to the surgeons than the internists. I do not think the internist, for one thing, has the responsibility that the surgeon has. H. does not make any onslaught on the patient for which he is held so directly responsible as the surgeon. Therefore it seems to me the surgeon ought to more particularly inquire into what chance there is for him to get away with the job. And it seems to me this method promises some sort of a preliminary estimation of what his patient is going to do.

Dr. Schmidt's remarks about cryoscopy I agree with, except this: I believe it is more difficult for the ordinary man to obtain efficiency in cryoscopy than it is with these tests. I think probably Kummel of Hamburg is the foremost man in insisting upon the utility of cryoscopy in relation to urological surgery. There still seems to be an impression among a lot of men that the estimation of the chemical ingredients of the urine is of importance without respect to the blood. Manifestly I cannot see this at all. The estimation of the urea in urine, standing out by itself, without any knowledge of the intake of nitrogen, without any knowledge of what the blood holds, it seems to me, gives a man very little information. Low urea in urine may mean something, or it may not. I believe the Ambard coefficient is of value, that is, the comparison between the urea in the urine, the urea in the blood, and the body weight. I believe all these things are of value. I believe that blood chemistry is simplified to such an extent that it justifies every one of you men giving it a thorough trial.

NEW GROWTHS OF THE TESTIS, THEIR SYMPTOMATOLOGY, DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, AND TREATMENT.

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In looking over the literature upon testiscular neoplasms one is struck by the variety of diagnoses, especially from a pathological standpoint. The classification and description of tumors of the testicle in modern genito-urinary text-books is so meagre and incomplete, to say nothing about being incorrect, the writer thought it would be of interest to bring the subject in more or less detail before this society. The reason for such a diversity of opinions in regard to the type of tumor we are dealing with is due to the fact that the growth was not carefully sectioned or studied enough pathologically or it would have been seen, in the greater proportion of cases, that we were dealing with a teratoma. For practical purposes there exists only one tumor of the testicle, namely, a teratoma. The testicular teratoma may appear in two forms, either as a complex teratoma containing tissue representing derivatives of all three embryonic layers, or as an embryonal carcinoma, alveolar or diffuse, polyhedral or rounded cells, often with lymphoid stroma. The latter is the most common tumor of the testicle, and it may or may not be possible to find in such a tumor other evidence of teratomatous elements, but even if no other teratomatous

elements are found, it seems reasonable to agree with Ewing in regarding this tumor as a one-sided development of a teratoma. In considering tumors of the testicle nine times out of ten we are dealing with a malignant tumor, which requires very early diagnosis and radical treatment in order to prevent metastasis and consequent death. Hence a study of new growths of the testicle comprises the study chiefly of carcinoma of that organ.

During the past eight years we have collected at the pathological laboratory of the City Hospital thirteen cases of new growth of the testicle:

Case No.		
I.	Age 5 years.	Duration 12 weeks.
II.	Age 34 years.	Duration not traceable.
III.	Age 40 years.	Duration not traceable.
IV.	Age 52 years.	Duration 2 years, 7 months.
V.	Age 43 years.	Duration 18 months.
VI.	Age 39 years.	Duration 2 years, 3 months.
VII.	Age 40 years.	Duration 14 months.
VIII.	Age 33 years.	Still living after five years.
IX.	Age 38 years.	Duration 6 months.
X.	Age 17 years.	Duration 10 months.
XI.	Age 30 years.	Still living after one year.
XII.	Age 45 years.	Still living after one month.
XIII.	Age 32 years.	Still living after 15 months.

A few points of interest might here be noted. Seven out of thirteen cases that we have been able to follow have already died, developing metastases. Of the fatal cases the youngest was 5½ years, the oldest 52. The longest duration of the disease was two years and seven months, the shortest ten weeks. Six out of the thirteen cases gave a definite history of trauma. Trauma may have been a predisposing or etiological factor in these six cases, and then again it may have been the first thing to draw the patient's attention to the tumor or its increasing size. The size is not dependent upon the length of time the tumor has

existed. In one case (IX) an undescended testis was the seat of the growth. In the majority of cases the growth was usually slow but progressive.

If we go back to the embryological development of the testicle, you will recall that it develops from the undifferentiated genital ridge or body which is in close proximity to the Wolfian ridge or body, the latter a complex structure which, when it reaches its usefulness, starts to retrogress. In no other part of the body is there such a complex embryological structure, therefore the adrenal, future kidney, and testicle which develop in such close proximity to this region are subject to weird embryologic processes, which result in the various complex and mixed tumors encountered in the adrenals, kidneys, and testicle.

It is through the lymph channels that metastases occur, chiefly in the retro-peritoneal and lumbo-aortic nodes. The growth metastasizes as carcinoma and not as teratoma. Recurrences have occurred as soon as one month following operation. Howard found that among 110,000 male patients admitted to a number of the London hospitals during a period of twenty years, there were sixty-five cases of malignant testicular disease, or about .06% of all male patients admitted. Of fifty-seven cases with complete histories, nine were in ectopic testicles, eight of these being in the inguinal canal and one just below the external ring. In 12,729 consecutive male admissions to the Presbyterian hospital in New York City there were found thirteen malignant testicular tumors. Of these, eleven were situated in the scrotum and two within the abdomen. Thus in 182,729 male admissions to general hospitals there were three cases of malignant growths of intra-abdominal testicles, or about one in each 60,000 cases. With such statistics it seems no more than right that we should report all cases. Coley, during the past twenty-five years,

has personally observed sixty-five cases of sarcoma of the testicle. In fifty-two the disease occurred in the entirely descended testicle, and in twelve in the undescended. Seventy-five per cent occurred between the ages of twenty-five and forty-five.

Case I. Well nourished, always healthy. Parents noticed a swelling of right testis which increased rapidly, reaching the size of a small hen's egg in one month's time, with involvement of the inguinal nodes and overlying skin. The tumor was removed at operation with three enlarged lymph nodes and structures extending up to the internal ring. Wound healed promptly, but after two weeks there was increasing anæmia, loss of flesh, fever and prostration. One month later, several firm nodules appeared in the skin of face and neck. With rapidly increasing anæmia, fever, and weakness the child died two weeks later.

Gross Examination: The tumor of the testis measures 3 x 2½ x 2½ cm. It involves the corpus highmori, rete, and epididymis and fuses their structure with the surrounding tissues. In the overlying skin there is no diffuse invasion. A circumscribed portion of intact testis which is found to be the whole organ lies at the posterior pole of the tumor sharply separated by a fibrous partition. The tumor is firm, well encapsulated, and free from necrosis.

Microscopic Examination: The testicular tumor is composed of diffuse areas of small and medium sized lymphocytes. Many cells show distinct cell body. This neoplastic tissue widely separates the intact tubules of the rete and epididymis and envades the neighboring fat lobules. The larger lymph nodes are completely replaced by medium sized tumor cells. In the capsules of the main tumor, the lymph nodes, and in the adherent overlying skin there is a diffuse infiltration by small lymphocytes.

Diagnosis: Lymphosarcoma primary in the rete and epididymis. Metastases in skin, inguinal and abdominal lymph nodes, liver, and kidneys. Duration twelve weeks.

Autopsy: Showed extensive enlargement of the retro-peritoneal lymph nodes, the largest 1¾ cm. in diameter. In both kidneys there were areas of diffuse infiltration. The lungs and liver show several miliary lymphomata. The spleen was moderately enlarged, section smooth, firm, grayish, follicles nearly invisible. Throughout the colon were numerous follicular ulcers. Peyer's patches were slightly swollen. Attached to the peritoneal surface of the colon were several small movable lymphomata.

Conclusions: The histological features of this tumor are in all respects typical of malignant lymphosarcoma. That the original tumor arose in the testis seems a necessary conclusion from the relative size of the tumors, that in the testis being much larger than any of the lymph nodes and showing local outgrowths of considerable extent as well as extensions in the overlying skin. The testicular tissue was found free from invasion by lymphocytes, while the rete and epididymis were extensively involved, hence we must conclude that this tumor started in the rete and epididymis rather than the testicle proper (which is the starting place of teratoma). No evidence was found of a trace of teratomatous elements.

(This case was studied by Dr. Ewing and described in his excellent paper "Teratoma Testis and its Derivatives." *Surgery, Gynecology and Obstetrics*, March, 1911.)

Case II. No tuberculosis or cancer in family. Is moderately alcoholic, negative venereal. Eight years ago was struck in left testicle by a piece of coal; says that the testicle did not pain or swell after the injury. Five days before admission to hospital he

had severe pain in left testicle, without any apparent cause. Felt along the testicle but noticed no swelling. The next morning he noticed a lump alongside of the left testicle about the size of a small peanut, very smooth, heavy and painful.

Physical Examination: All viscera in good condition. Lungs negative. In the left half of scrotum was felt a mass about 2 cm. in diameter, hard, independent of the testicle, but its movement limited.

Operation: An incision was made in the upper part of the scrotum 4 cm. long, extending upwards to the external ring. The epididymis was thickened, and it was drawn down and the vas ligated near the internal ring. In the globus major of the testis there was found a nodular mass, the size of a finger-nail, which encroached slightly upon the testicle. The testicle with its structures was removed. Wound healed promptly and the patient made a rapid recovery.

Gross Examination: Testis measures 2.5 x 2.5 x 4 cm., its tunica albuginia is smooth and glistening, its parenchyma normal. Situated in the globus major of the epididymis and rete testis, but not involving the body of the epididymis, is an oval, firm mass about 1 cm. in diameter. On section this mass is greyish white in color and there are no evidences of caseation. The rest of the epididymis is normal.

Miscroscopic Examination: The tumor of the rete and epididymis is composed of diffuse areas of small lymphocytes. Many cells show distinct cell body. There are no areas of caseation, or other evidence of tuberculous granuloma. Occasionally there was found small acini lined with cuboidal and flattened epithelium. We do not believe these are the compressed tubules of the epididymis or vasa recti and if they are not remnants of certain embryologic tubules, they might play an important rôle in proving the teratomatous origin of lymphosarcoma.

Diagnosis: Very early lymphosarcoma of the rete and epididymis containing epithelial structures. Duration not traceable.

Case III. Always in perfect health. Two years ago noticed small lump in right testicle, hard, and caused a small amount of pain on pressure. Mass gradually grew until it reached present size. No pain or discomfort except increase in weight of testicle.

Operation: Testicle removed, the epididymis appeared only slightly thickened in the globus major. Wound healed promptly and patient quickly recovered.

Gross Examination: The specimen consists of a solid tumor of the left testis measuring 6 x 6 x 9 cm., of firm consistency. On section the tumor cuts quite hard and is well confined to its tunica albuginea, which is thickened and laminated. The greater part of this tumor shows oval, round, and irregular branching masses of a pearly white color (cartilage); numerous cavities from one to four mm. in diameter filled with a colloid material of a greyish to brown color are seen scattered over a large portion of the tumor. Two large cavities 1 cm. in diameter contain yellowish colored colloid. The epididymis is not thickened.

Miscroscopic Examination: Shows the main part of the tumor is composed of irregular islands of hyaline cartilage. There are also present bundles of smooth muscle, considerable lymphoid stroma, areas of fibrosarcoma and a few scattered epithelial lined cavities with low cuboidal cells. Some of the larger cavities contain colloid material and resemble thyroid acini.

Diagnosis: Teratoma testis containing cartilage, smooth muscle and lymphoid tissue.

Case IV. For over the last two years has noticed a slow growing tumor of the right testis; during the

last two months has grown rapidly reaching its present size and causing considerable pain. For the last six months has lost weight and feels weak.

Examination on Admission to Hospital: Patient extremely emaciated, dyspnœic and weak. Large tumor in right half of scrotum, with nodular masses along cord and in inguinal canal. Considered inoperable.

Result: Died one month after admission, and autopsy showed extensive masses in retroperitoneal glands, and metastatic nodules in lungs and liver.

Gross Examination: The specimen consists of a solid tumor of the right testis, measuring 7 x 7 x 8 cm. On section, the lower half shows oval, round, and irregular masses of cancer, yellowish in color and surrounded by fibrous trabeculæ; the upper half shows extensive necrosis with hemorrhagic extravasation. Normal testicular tissue could not be found. The epididymis and cord were extensively involved with solid carcinoma.

Microscopic Examination: The large part of the tumor is composed of large celled alveolar carcinoma with extensive areas of necrosis. There can also be found small areas of cartilage, fat and smooth muscle tissue. In places there is extensive lymphoid infiltration of the stroma.

Diagnosis: Teratoma testis, showing large alveolar carcinoma (sarcoma), fat and smooth muscle tissue, minute islands of cartilage, with extensive necrosis.

Case V. No cancer or tuberculosis in family. Always well, but nervous. Eight years ago had vague stomach trouble. Denies venereal diseases and excesses.

Present History: One year ago, while stirring varnish with a big stick, he noticed a sharp pain in left inguinal region, shortly after this the left testicle began to swell. Swelling gradually became larger and firmer in consistency.

Operation: Orchidectomy, tumor of an orange removed with small amount of epididymis and vas. Recovery uneventful, primary union in wound.

Result: Three months later, after sea bathing and considerable swimming, patient complained of severe chill; next day noticed a hæmatoma in site of scar. The old scar soon broke down, with considerable oozing, and a second operation was done, removing an elliptical mass including the scar tissue and cord and vessels up to the internal ring. At the present time the wound has healed again, but in the inguinal canal near the internal ring is a nodular mass. Otherwise his health is fair. We expect this case to develop metastatic growths. Within three months he had another recurrence in same site which rapidly became tremendous in size. Patient became rapidly emaciated and cachectic and developed metastatic growth.

Gross Examination: The specimen consists of a solid tumor of the left testis, measuring 5 x 7 x 7 cm. The tumor is well confined in its tunica albuginea, but invaded the mediastinum, rete testis, and globus major of the epididymis. The cord above is not thickened. On section the tumor presents a variety of areas, some yellowish in color (carcinoma), others shades of red (hemorrhage). A very few minute areas of pearly white color (cartilage) can be seen near the center. Scattered over various portions can be seen small cysts 2 to 4 mm. in diameter containing colloid. No trace of testicular tubules can be seen. The whole tumor is quite œdematous.

Microscopic Examination: The tumor is composed largely of very œdematous embryonal connective tissue, which in places is so cellular and packed that it may be called fibrosarcoma and small spindle sarcoma. Scattered in the stroma are numerous collapsed and distending cavities lined with low cuboidal epithelium; some of these contain a colloid material

and appear to be thyroid tissue. Numerous areas are present, composed of alveoli of large polyhedral cells with large vescular nuclei and scant cytoplasm; the stroma around these areas is frequently infiltrated with lymphocytes.

Diagnosis: Complex teratoma with cartilage, thyroid tissue, epidermoid cysts, smooth muscle, lymphoid tissue, glandular structures, lined with cuboidal and cylindrical cells, alveolar and diffuse carcinoma. Duration, 18 months.

Case VI. Past history uneventful. Two years ago was hit in scrotum on right side; soon after a mass developed which gradually increased in size. Two weeks before admission to hospital had sharp pain in right lower quadrant of abdomen. Has had pain more or less ever since, often shooting down right leg. Pain eases when he lies down.

Physical Examination: Poorly nourished, anæmic man, few fine and coarse rales over the lower lobes of both lungs. In right half of scrotum is a large firm mass 15 cm. in diameter, with distended veins running over the tumor. Urine and blood negative.

Operation: Tumor with the adjacent structures removed.

Result: The patient became rapidly emaciated after the operation, and developed near the seventh rib in the left axillary line a slightly movable hard mass 3 x 5 cm., apparently connected with the rib. He died three months after the operation with physical signs of broncho-pneumonia and cachexia and extreme weakness.

Gross Examination: The specimen consists of a large solid tumor of right testis measuring 9 x 12 x 14 cm., in portions quite solid, in others there is a sense of fluctuation. The tumor is well confined by its tunica albuginea, is heavy and solid. The cord is only slightly thickened. On section the tumor has

a yellowish color, and shows considerable areas of necrosis and hemorrhage. In places bright yellow (fat) masses from 1 to 4 mm. can be seen; also cartilage areas about the same size. The large portion of the tumor is distinctly carcinomatous.

Microscopic Examination: Is of interest because the tumor is largely composed of carcinoma, which has an arrangement in mantels around a central capillary, a "perithelial carcinoma." In many respects this tumor appears like portions of hypernephroma. Teratomatous elements are difficult to find, but are present in the form of cuboidal lined epithelial structures, small islands of cartilage, fat tissue, and smooth muscle.

Diagnosis: Teratoma testis, consisting chiefly of perithelial and alveolar carcinoma with lymphoid stroma. Cuboidal epithelial structures, small islands of cartilage and adipose tissue, smooth muscle. Duration, two years, three months.

Case VII. Past history and family history negative. Present History: Noticed tumor in right half of scrotum eight months ago. Lost considerable flesh and strength and complained of dull aching pain in right iliac region. No history of trauma. Was under doctor's care four months before he came to hospital.

Physical Examination: Negative.

Operation: Usual incision; tunica vaginalis was markedly thickened, and several small nodules felt along cord. Cord freed well above internal ring, pushing peritoneum away, appeared normal, and was ligated. No inguinal or femoral glands palpable. Primary union in wound, but patient had an afternoon temperature reaching 102 Fahrenheit, off and on for several days. He received 21 injections of Coley's fluid.

Result: Three months after operation, he complained of indefinite pains in the abdomen, under

Fig. 1.

Teratoma Testis. In these two tumors the type of growth is that of a soft or encephaloid character. They are composed almost entirely of alveolar carcinoma with lymphoid stroma, and only after very extensive sectioning if at all can other types of tissue be found. The growth, however, we believe to be teratomatous.

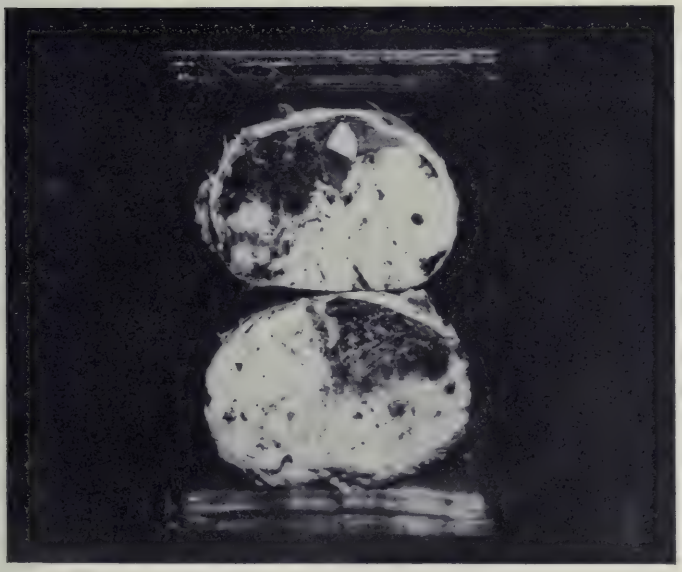

Fig. 2.

Teratoma Testis. This growth is almost entirely composed of cartilage and might be spoken of as an enchrondroma. It is perfectly easy, however, to find in sections numerous other types of tissue.

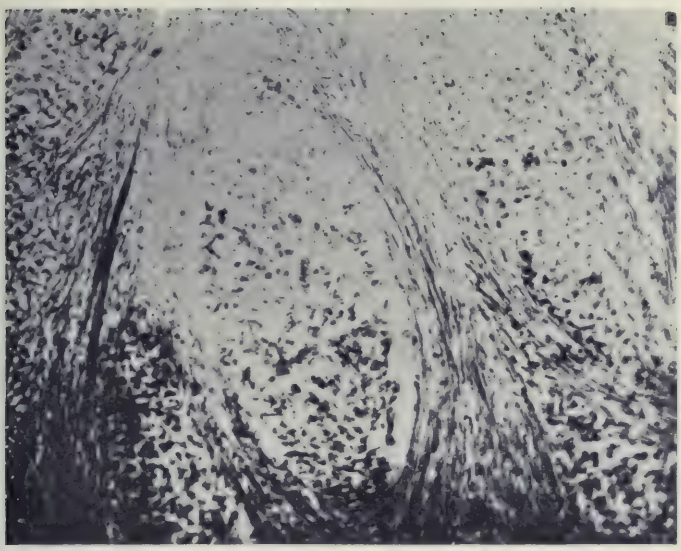

Fig. 3.
Teratoma Testis. Showing alveolar carcinoma.

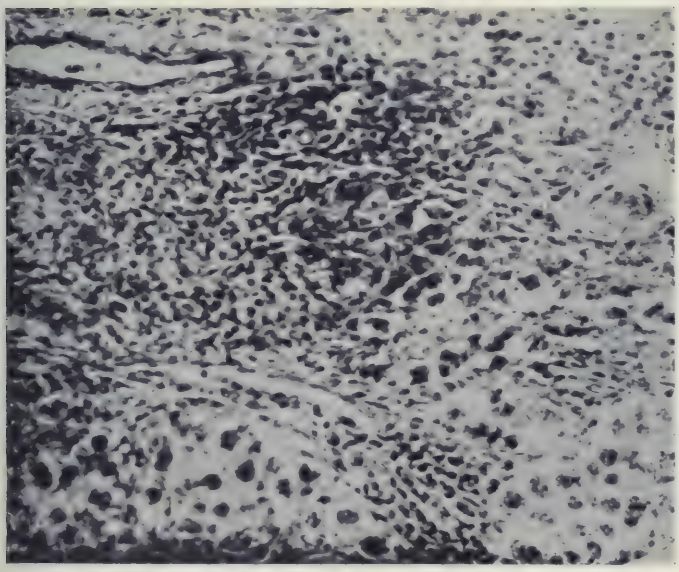

Fig. 4.
Teratoma Testis. Showing alveolar carcinoma with lymphoid stroma.

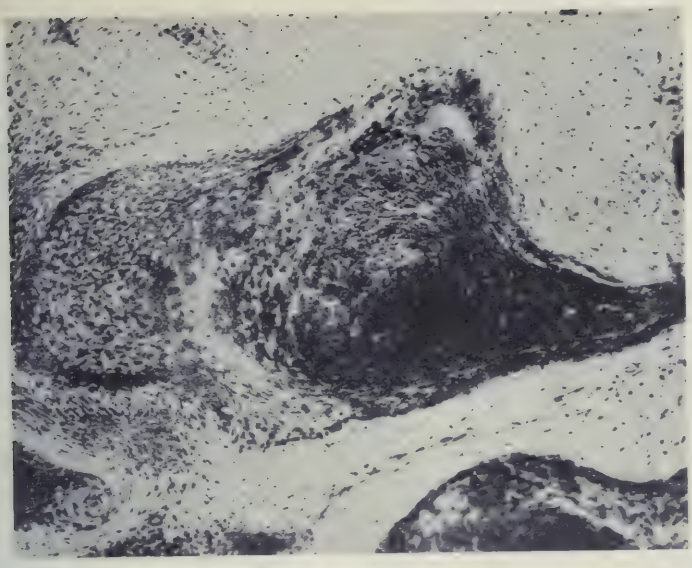

Fig. 5.
Teratoma Testis. Showing tissue resembling thyroid tissue.

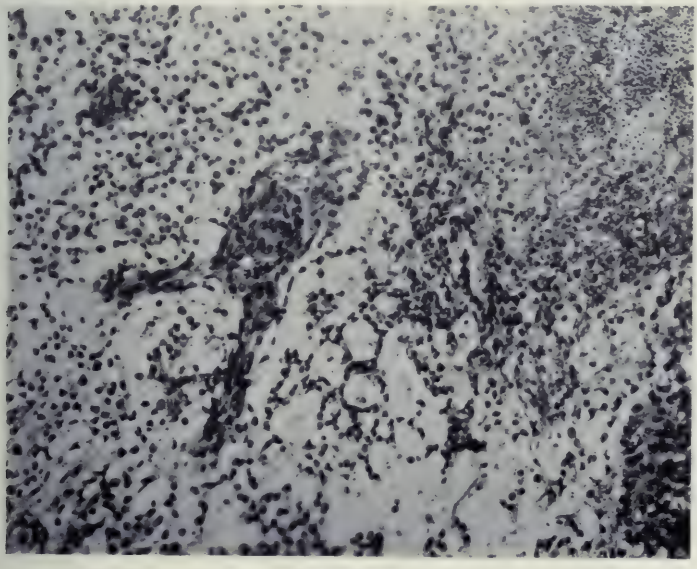

Fig. 6.
Teratoma Testis. Showing epidermal tissue.

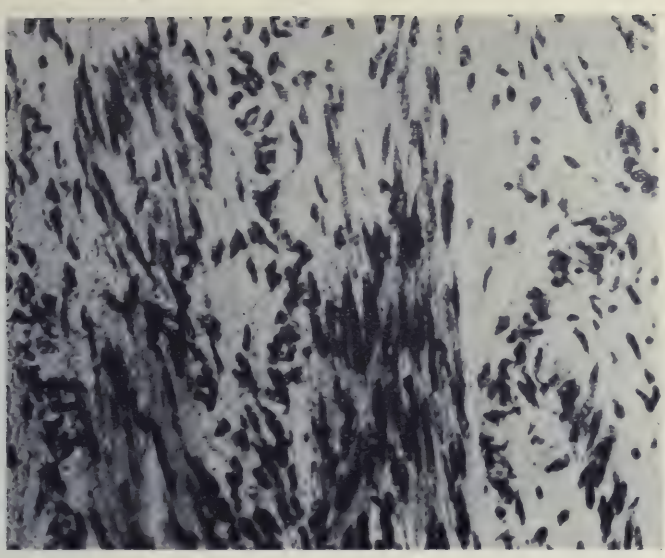

Fig. 7.
Teratoma Testis. Showing smooth muscle.

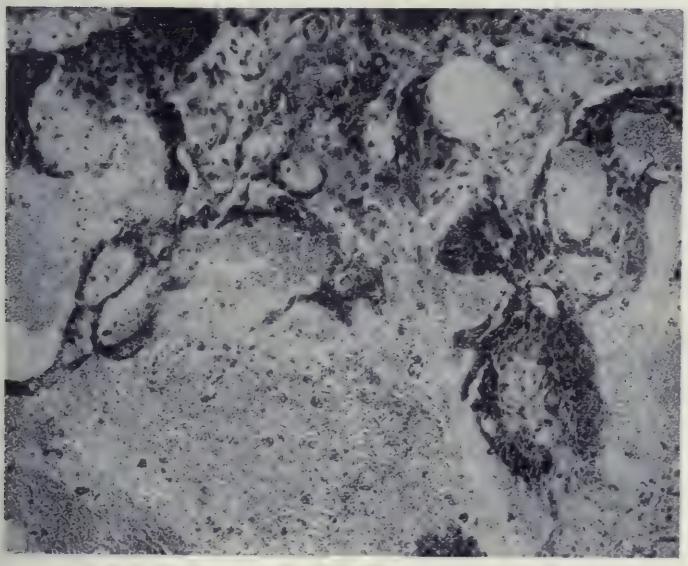

Fig. 8.
Teratoma Testis. Showing hemangio-endothelioma.

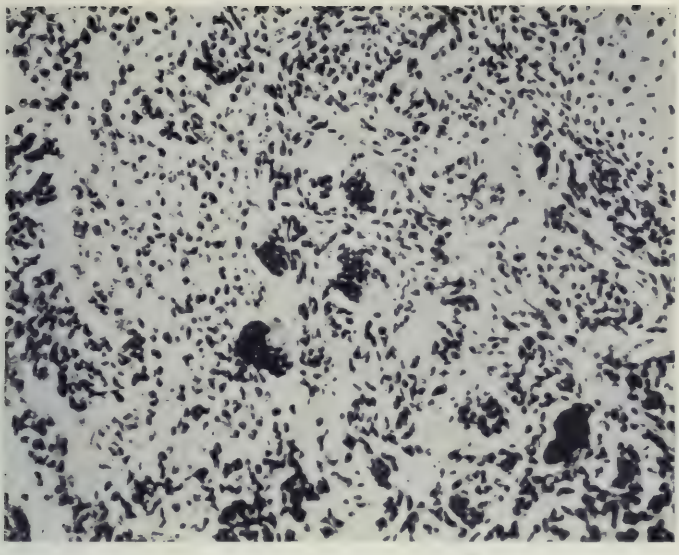

Fig. 9.
Teratoma Testis. Showing giant-cells of the osteoclast type.

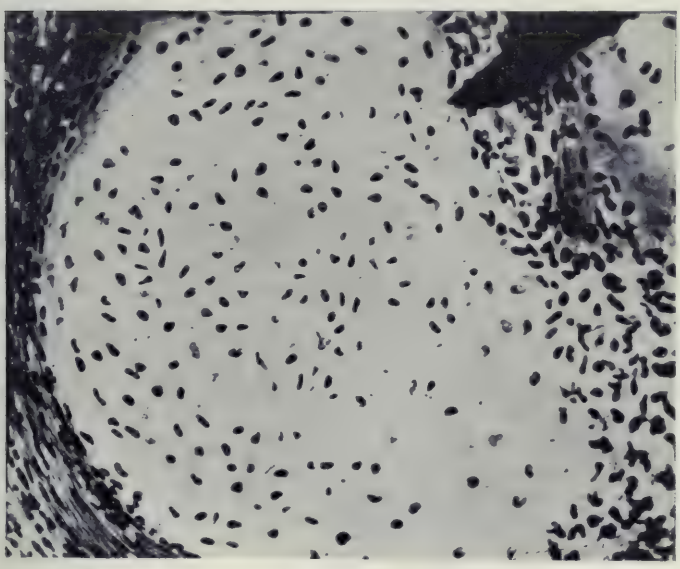

Fig. 10.
Teratoma Testis. Showing hyaline cartilage.

ribs and over back of chest. On examination he was quite dyspnœic; no local recurrence of palpable masses was found. Two months later, a mass the size of a duck's egg developed on left side of neck just above the clavicle. There was found indefinite sensation of mass near umbilicus, with small areas of dullness plus fine rales scattered over both lungs. He was cachectic, markedly emaciated, and extremely weak. He died one month later.

Gross Examination: The specimen consists of a solid tumor of the right testis measuring 4 x 6 cm., oval, quite firm in consistency, and on section yellowish in color. It is quite well confined to the testis except at its inferior pole where it infiltrated the tunica albuginea and tunica vaginalis. There is a small clot of blood in the cavity formed by the tunica vaginalis, the latter is quite thick over the adherent area. On section the tumor is composed of round and oval masses of cancer, 1 mm. to 2 mm. in diameter, there is extensive infiltration of the mediastinum, body and globus major of the epididymis. The vas shows carcinoma for at least 6 cm. above the testis.

Microscopic Examination: Sections made from center and edges of the growth show it to be composed largely of large alveolar called carcinoma containing large vesicular nuclei, well-defined nucleolus, and scanty cytoplasm. In many places typical picture of adeno-carcinoma is seen, in other areas diffuse carcinoma with lymphoid stroma. In addition there are frequent bundles of smooth muscle and small lymph nodes with germinal centers and large areas of necrosis.

Diagnosis: Teratoma testis, adeno-carcinoma, alveolar and diffuse carcinoma, lymph nodes, epithelial structures, and thyroid. Duration, 14 months.

Case VIII. Family history and past history negative. Present History: Without any apparent

cause, two and one half months ago an enlargement started in the right side of the scrotum without pain or other symptoms. No definite history of trauma.

Operation: Radical operation done. Celluloid inserted for cosmetic effect. Recovery uneventful.

Gross Examination: Solid tumor of the right testis measuring 4 x 6 x 6 cm. The tumor is well confined in the tunica of the testis, the tunica vaginalis and epididymis are not involved. On section, hard, yellowish and grey in color, rather broad connective trabeculæ traversing tumor. A very small amount of compressed testicular tissue is seen at the lower pole lying just beneath the tunica albuginea.

Microscopic Examination: Shows the tumor to be composed of large-celled alveolar carcinoma with lymphoid stroma and areas of necrosis. No other types of tissue were found.

Diagnosis: Carcinoma with lymphoid stroma.

Case IX. Family history, past history, and personal history, negative. Present History: Patient has always been well but states that he never had but one testicle in his scrotum and that he was conscious of the presence of the other one low down in his groin. Three months ago while attempting to move a large piano he felt a snap in his left groin and when he felt of himself there he noticed he had two testicles in his scrotum, but the one on the left side was high up and much smaller. He complained of very little pain at the time but in a few weeks this left testicle started to enlarge and was quite painful, due mostly to the pulling on the cord.

Physical Examination: A powerfully built, tall, and healthy-looking individual. Tight up against his external ring on the left side was a mass the size of a small orange, which was firm.

Operation: Orchidectomy.

Result: Wound healed promptly and patient went home from the hospital in about two weeks. Within a month he started to fail, rapidly losing flesh and strength, and showed clinical evidences of metastases. He died six weeks later.

Gross Examination: Solid tumor of left testicle measuring 9 x 9 x 4 cm., confined within tunica. No remains of testicular tissue seen. On section, encephaloid, red and yellow areas intermingled.

Microscopical Examination: Carcinoma, alveolar, embryonal with areas of lymphoid stroma, extensive necrosis and hemorrhage. Areas of cyst-adenoma. Epithelial glandular structures and smooth muscle.

Diagnosis: Teratoma testis (in an undescended testis). Carcinoma with lymphoid stroma. Cyst-adenoma. Epithelial structures, glandular. Smooth muscle. Duration, 6 months.

Case X. Family history, previous history, and personal history, negative. Present History: For the past five months patient has noticed a swelling in the right half of his scrotum which has slowly increased in size. No history of trauma. Complains of slight dragging pain, probably due to the weight of the tumor.

Physical Examination: Well-nourished young man, all viscera negative except right testis, which is enlarged to about the size of a small orange. No translucency to light. Has a firm feel.

Operation: Radical operation done.

Gross Examination: Solid tumor of right testicle, measuring 11 x 6 x 5 cm. On section, soft and in places mottled reddish to greyish color.

Microscopic Examination: Carcinoma with lymphoid stroma. Considerable myomatous tissue. Fibrosarcomatous areas. Small scattered amount of smooth muscle.

Diagnosis: Teratoma testis. Carcinoma with lymphoid stroma. Myoma. Fibrosarcoma. Smooth muscle.

Result: Four and a half months later patient showed clinical evidences of metastases in the liver and lungs and died shortly after. Duration, 10 months.

Case XI. Family history, past history, and personal history, negative. Present History: Two months ago while doing some gymnastic work he fell astride of a horizontal bar and that same evening he had some little pain in his right testicle. In a few days he was apparently well but about a month later his right testicle started to gradually increase in size, but no pain.

Physical Examination: Negative except for a tumor mass in the right half of his scrotum.

Operation: Radical operation done.

Gross Examination: Solid tumor of the right testicle measuring 9 x 5 x 4 xm. Quite firm. On section, yellowish to greyish white.

Microscopic Examination: Carcinoma, alveolar, embryonal with lymphoid stroma. Considerable fibroplastic tissue.

Diagnosis: Teratoma testis. Embryonal carcinoma with lymphoid stroma. Duration, patient at present writing (Jan. 20, 1917) is alive and apparently well.

Case XII. Past history, personal history, and family history, negative. No history of trauma. Present History: Patient noticed a small lump in the right testicle two months ago, which has steadily grown in size until the present time.

Physical Examination: Negative except for a tumor mass in the right half of scrotum. No glandular involvement palpable.

Operation: Orchidectomy with removal of adjacent structures.

Gross Examination: Solid tumor of the right testis 3 x 4 x 2 cm., tumor confined within tunica

of testicle, tunica vaginalis and epididymis not involved. On section, greyish white and reddish in color. Distinctly cystic, about the consistency of a rubber sponge.

Microscopic Examination: Tumor composed chiefly of adenomatous areas with cyst-adenoma, histologically benign. Small areas of hyaline cartilage and smooth muscle.

Diagnosis: Adenoma simplex, cyst-adenoma, cartilage, and smooth muscle. Teratoma. Duration, at present writing (Jan. 20, 1917) patient is alive and apparently well.

Case XIII. Past history, family history, and personal history, negative. Present History: Thinks he was struck by a base-ball in scrotum a few years ago. Now has a swelling in the left side of the scrotum which has been gradually increasing in size for three or four months. Tumor gave no pain or light translucency.

Operation: Orchidectomy with adjacent structures. Result: Patient made an uneventful recovery, but four months later he presented himself with a growth in the site of the operative scar two-thirds as large as the original tumor.

Gross Examination: Solid tumor of the left testicle measuring 5 x 6 x 3.5 cm. On section, greyish red in color with small cystic areas.

Microscopic Examination: Adeno-carcinoma chiefly and small areas of carcinoma with and without lymphoid stroma, few epithelial structures.

Diagnosis: Teratoma testis, adeno-carcinoma, alveolar carcinoma, lymphoid stroma, epithelial structures. Duration, at this writing (Jan. 20, 1917) is alive and apparently well and there is no clinical evidences of metastases.

Diagnosis. As a rule the patient seeks advice on account of a swelling in either side of the scrotum,

which he has probably noticed for months, and the increase in size has been very gradual. Pain is usually absent, unless the tumor is large enough to give a dragging sensation from its weight. The tumor may range in size from that of a horse-chestnut to that of a cocoanut, being ovoid in shape. There may be soft, semi-fluctuating areas, due either to degeneration of tissue in one part or another, or to rupture of blood vessels within the growth producing a hæmatoma, or to both. The surface outline as a rule is well defined, smooth, and slightly lobulated, in large tumors the epididymis is flattened out by pressure and finally becomes invaded by the growth. The tumor may feel hard or semi-solid, except when it has an associated hydrocele. The very large growths have a tense, elastic, cystic feel. The surface blood vessels are greatly dilated and tortuous. The growth itself is non-translucent and freely moveable. Further examination very seldom reveals much of diagnostic value, the blood, urine, etc., has usually been negative.

Differential Diagnosis. New growths of the testicle are to be differentiated from tuberculosis and gumma. In tuberculous lesions, the family or personal history is of help, the growth is insidious in onset, increases in size more rapidly, is associated with pain, sometimes fever. First manifests itself as a nodular mass in the tail of the epididymis. Can often feel a chain of small nodules along the vas deferens. It is only later on in the disease that the testis is involved. Tubercle bacilli may be found in the urine, also indurations about the prostate and vesicles. Testicular tuberculosis is usually only one feature of a general genital tuberculosis. Testicular tuberculosis has recrudescences and exacerbations, suppuration, softening, breaking down, and fistula formation.

In gumma a history of syphilis either hereditary or acquired, the testicle is evenly enlarged with a

"clam shell" epididymis and nearly always has an associated hydrocele. Positive Wassermann is of help.

Prognosis. The mortality is very high and Chevassu reports that of 100 cases treated by castration, 81 died, 19 recovered.

Died within 1 year	38
" " 2 years	17
" " 3 "	9
" " 4 "	2
Date uncertain	15
	81 cases

Of the writer's thirteen cases seven died as follows:

Within 1 year	3
" 2 years	2
" 3 "	2
	7 cases

Treatment. The majority of surgeons who have operated upon these growths have done little more than castration and excision of the cord. Such a minor procedure may be sufficient in those cases where a very early diagnosis is made; in other words, before there is an invasion of the regional glands.

The only hope surgeons can have of decreasing so appalling a mortality as we have in this disease is not only early recognition of the trouble, but its removal by the radical operation. Gregoire in 1905 performed the first complete radical operation and since then there have been surprisingly few reported. The mere fact that we get such a high mortality from recurrence in cases of orchidectomy, where we felt the regional glands clinically gave no evidence of involvement, while in truth the microscopical examination would invariably reveal an invasion by the growth, is sufficient to justify the radical operation in every case.

Coley believes that this own series of cases show that cancer of the testis treated by simple orchidectomy, without any appreciable risk, and followed by a thorough course of treatment with the mixed toxins of erysipelas and bacillus prodigiosus (also without risk) has a far better prognosis than that subjected to the very extensive laparotomy with removal of the lumbar glands, as advocated by Chevassu, Hinman, and others.

Operation. The incision which has been most often employed to allow of removal of the testicle and cord and to give access to the lumbar glands commences over the upper part of the scrotum, extends up to the external ring, along the inguinal canal, and is prolonged to a point half an inch above the anterior superior spine; the incision then curves upwards until it reaches the costal margin at the level of the tenth rib. At the beginning only the first part of the incision to the external ring is made and the testicle and cord are dissected free. If there is any doubt as to the diagnosis, the testicle should be incised at this point. If malignant disease is present the operation is continued. The incision is prolonged in the direction defined above and carried through the muscle of the abdominal wall until the peritoneum is reached. The cord is traced until it passes through the internal abdominal ring, and then while the sides of the incision are strongly retracted, slight tension is applied to the cord so that its further course may be easily recognized. In its retroperitoneal course the vas is adherent to the posterior aspect of the peritoneum, and the next stage in the operation consists in freeing the cord and reflecting the peritoneum mesially. The cord is traced down well into the true pelvis and there divided between two ligatures, the cut surface being treated with the cautery or pure carbolic. This may be regarded as the first stage

in the operation and requires no extraordinary care. The second stage consists in the free dissection of the fascia over part of the iliacus and psoas muscle, together with the contained spermatic vessels and lymphatics, and the removal of the glands from off the inferior vena cava and aorta. When the vas has been divided the spermatic vessels are seen no longer to form a rounded bundle, but to become spread out. It is therefore necessary to make a wide dissection of the fascia on the outer side and this should extend to the outer border of the psoas. On the inner side the line of division of the fascia should pass mesially so as to cross the common iliac at its bifurcation; the ureter will here be encountered and must be freely exposed. The dissection is then carried along the inner side of the common iliac vessels up to the bifurcation of the aorta. When the left testicle is affected the inner boundary is carried up along the right border of aorta, and special care must be taken not to injure the inferior mesenteric artery. When the right testicle is the seat of the tumor, the inner border is continued over the middle of the aorta. In both cases the upper limit is the upper border of the renal veins. Between these boundaries everything must be removed. During the dissection the spermatic vessels are traced up to their junction with the main vessels and must be ligated and divided. When all bleeding points have been secured the peritoneum is allowed to return into position, and the abdominal wound is closed without drainage, each of the muscles being stitched up separately.

DISCUSSION

OF PAPER OF DRS. O'CROWLEY AND MAITLAND.

DR. HERMAN L. KRETSCHMER, Chicago: I think Dr. O'Crowley is to be congratulated on being able to collect twelve or thirteen of these rather rare tumors. It seems to me this subject ought to be thoroughly discussed because of the infrequent occurrence of these tumors, and as he has so ably told us, because of the gloomy prognosis of these cases.

DR. A. C. STOKES, Omaha: It has been my lot to observe two of these tumors — two that I thought were these tumors. I cannot add much to what has been said, except to emphasize the fact that if you will send slides from different parts of these tumors, as I have done, to the same pathologist, and slides from these tumors to different pathologists, you will get about as many different diagnoses as you send slides. The problem is indeed a bizarre affair to attack. In the two cases which I reported at the American Medical Association in 1911, slides have been to a number of pathologists, and I think that Dr. O'Crowley had two of my slides. I believe he sent back word that neither one of them were teratoma. One of these men died under my observation with a retroperitoneal mass and metastases in the liver, lung, and brain. If that wasn't a teratoma clinically then I never have seen one.

In the other case I made a diagnosis — and I am not a pathologist — of syphilis of the testicle. I sent it to our pathologist at the University of Nebraska and he said it was a mixed tumor. Then I sent it to Rochester and it came back with the diagnosis of mixed tumor. Then I sent it to Hoekton in Chicago and he said it was a mixed tumor. All I did in this case was to remove the testicle and the cord up to the internal ring. That man a year ago was still alive, with no metastasis at all. The matter needs considerable more study and a better classification of these tumors.

One word about a case I saw a day or two ago. This case was a complicated affair. He had a hernia and a hydrocele. I did part of the hernia and sewed up part of the internal oblique. I pulled the testicle up, and it was a big mass, and I thought it was a peculiar hydrocele. I cut down on the part where I thought the hydrocele was, and the rete testis came out like mush. I went a little further up the cord and found a hydrocele. Around

the whole testicle there were apparent signs of a low-grade inflammation. All the veins along the cord were enlarged and congested. In the bottom of the inguinal canal there were three or four veins as large as a good-sized goose quill. There appeared to be a low-grade inflammation, somewhat suggesting syphilis. This is, I believe, one of those bizarre tumors which the Doctor has described, with a beginning metastasis.

N. B. — The sequel has proven this case was a general inflammatory reaction of unknown origin — not syphilis or teratoma.

DR. H. J. SCHERCK, St. Louis: I think of all the papers that have been read before this meeting, the paper just read is one of the most important. My interest in teratomas of the testicle was stimulated by a case that I saw about three years ago, and incidentally I would like to ask Dr. O'Crowley if he has ever seen a case of double teratoma of the testes. This case came to me with tumors of both testicles. The patient declined operation and returned, I think in a couple of months, with these tumors immensely enlarged. At that time there was no hope in operation. On the first occasion I took a photograph. At the second examination there was considerable extension of the tumors. He died soon after. An autopsy was done and sections were examined by a competent pathologist with the diagnosis of double teratoma. There is no question that many tumors of the testicle are improperly diagnosed. All of us see tumors coming to our service and we are inclined to make the easiest and most common diagnosis. This paper is a very timely one.

DR. F. W. ROBBINS, Detroit: I want to refer once more to the Coley fluid in treating certain classes of tumors of the testis. I will just mention this one case which I suppose was a teratoma. At least it was a very rapid growing tumor, not so rapid in its onset, the tunica vaginalis having been punctured to draw off fluid once or twice, two or three months before I saw the case, that fluid being bloody at the last puncture. The tumor was a large one, about the size of my fist, and the first operation was simply to remove the testicle and a portion of the skin of the scrotum. It made a very pretty wound and looked like quite a successful operation, but what was my horror to note that inside of four days that tumor was growing. I do not know whether this is a very unusual experience or not, but it was unusual to me, being the only case of the kind I had ever seen. Then I went in again and removed the entire half of the scrotum and cord way up to the inguinal ring, and again had a beautiful looking, clean

wound which began to heal, but inside of four days that was growing again. That tumor you could see grow every single day, until in about four days it was nearly as large as my fist. Having had this experience with operation and just having seen Dr. Coley, I instituted his treatment. On the second injection (these being given daily) the growth stopped. The third day the growth was perceptibly smaller. Inside of three weeks that growth was entirely gone and remained away. I believe that man died some three or four years afterward from tuberculosis. To me it was a remarkable case, and I could see no reason for the disappearance of that growth unless the Coley fluid be credited with this rapid shrinkage.

DR. J. S. READ, Brooklyn, N. Y.: I have seen five of these cases, probably stimulated to look for them by having heard Dr. O'Crowley's earlier papers. I have seen them in the last three years. Two of them died within a year. One had a recurrence in the other testicle six months after operation. That tumor was removed and the man has been well for a year. The other two were lost sight of.

Since my attention has been called to the rapid malignancy of these cases, the practical clinical lesson that I have learned is that with any small tumor of the testicle, no matter whether it is painless or not, syphilis having been excluded by the regular test and ten days' treatment, I advise and will urge and insist on immediate operation, and if on exposure of the testicle it is not tuberculous a complete, radical removal of the testis and as much of the cord as is easily gotten at is indicated.

DR. T. L. HOWARD, Denver: In August, 1916, I examined a man suffering with an enlarged, hard, left testicle. The right testicle had atrophied many years ago, following an orchitis due to mumps. Two months previous to this time during intercourse he experienced a sudden sharp pain in the left testicle, and same began to increase in size and hardness from that time. Examination of blood from every standpoint was negative, no enlarged glands, no loss of weight or sexual desire. The testicle itself was uniformly hard and enlarged, with no involvement of epididymis. Seminal vesicles and prostate negative. A large aspirating needle was introduced and a thick gelatinous fluid was withdrawn. Same examined by a competent pathologist revealed no abnormal cells. I advised removal of this testicle but he refused. Later he telegraphed me from Omaha, his home, that he intended going to Chicago on business and wanted to see some genito-urinary

surgeon there. Dr. Schmidt advised the removal of this testicle, which was done, and the pathologist reported it to be a teratoma.

In my opinion, patients suffering from a suspected malignancy in the testicle should be thoroughly *x*-rayed, especially the lungs, liver, and genera labdominal cavity, in an attempt to rule out, as far as possible, any metastatic involvement before they are operated on. In the past few days this patient has written me that both breasts have begun to enlarge. This is probably due to the loss, though, of all testicular secretion.

DR. O. S. FOWLER, Denver: In this connection, I wish to report one case. A year and a half ago a healthy young man presented himself, giving a history that two years previously he had had the left testicle removed with a diagnosis of sarcoma. At this time he had enlarged inguinal glands, which I removed, and which came back with the diagnosis of sarcomatous glands. At that time I found no glands in the abdomen. A year after the first séance he came again with other enlarged glands in the same region. These were removed, and at that time I could not find anything in the abdomen. Nothing has occurred in the last six months. I should like to ask Dr. O'Crowley to state what he would recommend or uses as of possible value in these recurring cases.

DR. A. NELKIN, New Orleans: Dr. Read touched lightly upon one point I think we ought to bear in mind in making the diagnosis of malignant growths of the testicle. We all understand in these cases the earlier the operation, the better the prospects of recovery. At the same time, we must not make the other mistake of sacrificing testicles that might be saved except for our mistaken diagnosis. I may be peculiarly situated, but I have in mind three cases, one of them a boy who consulted a surgeon of considerable experience and was told he had inoperable sarcoma of the testicle and who recovered in two or three weeks under ordinary mixed treatment. Another case I have very vividly in mind is a young lawyer in my community who had had a testicle removed with a diagnosis of sarcoma, concurred in by three of our leading pathologists, who studied the slides very carefully. About a year later he consulted one of our surgeons with a mass in the wound. The suggestion of course was of recurrence. This surgeon did a very radical operation. He opened the young man up to his ribs and searched the abdomen carefully, but found no sign of malignancy. The mass he thought was malignant proved to be adherent

omentum through a hernia, and this man seven years later is entirely well, in spite of the diagnosis of sarcoma.

A third case occurred recently in my own experience. He was a patient in whom I had a rush diagnosis made and the pathologist reported sarcoma. In this case I removed the testicle high up. I made no attempt at this time to go into the abdomen. He returned six months later with evidences of syphilis, positive Wassermann, and under treatment is entirely well.

The possibility of these tumors being syphilis must be borne in mind, and it seems to be true that the syphilitic testicle responds well to treatment, whether salvarsan, mercury, or iodides. While we agree that we should operate early in true malignancy, at the same time we do not want to sacrifice healthy testicles.

DR. D. N. EISENDRATH, Chicago: I think we owe a debt of gratitude to Dr. O'Crowley for having helped to straighten out the pathology of these malignant tumors of the testicle. I think we can agree with him that practically all of the cases which we have formerly called sarcoma and carcinoma of the testis in reality belonged to these so-called mixed cell tumors, or teratomas. I think that there can be no question at all in regard to that subject becoming cleared up.

Dr. Robbins said something in connection with his case in which he used the Coley toxin which interested me, namely, that the man later died of tuberculosis of the lungs. It has been my experience that several cases have been sent to the hospital which were diagnosed as tuberculosis of the lungs, even by competent so-called tuberculosis specialists, who, in neglecting to go over the man carefully, forgot that he had had a testicle removed. I remember a case of that kind which was sent in as a typical case of tuberculosis, and I happened to have operated three years previously, and the tuberculosis was a sarcomatosis of the lungs.

Then there is something I have had my attention called to, and that is the question of symptomatic hydrocele. Whenever I see a hydrocele appearing in a young person or in middle age, apparently without any other cause, especially if it does not give very much translucency, I am always suspicious about the hydrocele being secondary to a tumor of the testis. Then there is the question of the development of a teratoma in an undescended testis. This will occur no matter where the testis lies. It may occur in intra-abdominal testes, or in the inuginal region. The accidents that may happen can just as well occur in an undescended testis which has a tumor in it.

I recall a case in which we never suspected the presence of a teratoma until two years later when the patient had suddenly a metastasis in his hip joint. I had seen the case originally in consultation. We thought it was a teratoma, hidden under a torsion and inflammation of an enormous testis, and it turned out to be a torsion of a teratomatous testis.

We are just beginning to appreciate that a person may have two diseases of the testicle at the same time. For example, in the tongue we have not infrequently the combination of carcinoma and syphilis, and very frequently the cases will clear up beautifully up to a certain extent with antiluetic treatment, and then the carcinomatous portion will go right on and metastasis will take place. The same thing will take place in the testicle. We must not think the testicle can have only one disease. We can have a combination of syphilis plus teratoma.

DR. E. O. SMITH, Cincinnati: I want to add a word of appreciation of what Dr. O'Crowley has done for us on the pathology of these tumors. My experience with Coley's serum is just exactly opposite to that of Dr. Robbins. The only effect it produced was a general reaction without any influence on the growth of the tumor.

Someone mentioned that these growths in the testicle developed rapidly, and any rapid enlargement in the scrotum should be regarded with suspicion at least. A case presenting a rapid development in the left side of the scrotum came under my notice some time ago in a young physician thirty-two years of age, who, while in the act of defecating, noticed a severe pain in the left side of the scrotum, soon accompanied with marked swelling. It was my opinion that he had a hæmatoma and advised that it be left alone, which proved to be the correct thing to do. He had an apoplexy in his scrotum. Later he also had an apoplexy in the brain. He denies syphilis, and the Wassermann is negative.

The post-operative treatment to prevent recurrence in the groin has been mentioned. Coley's serum has failed and everything else has failed, except massive doses of *x*-ray, given with the Coolidge tube. We have had two instances in our own experience and one that was called to our attention in the experience of another physician, where massive doses seemed to melt away these masses that were beginning to recur in the groin and in the abdomen. Five to fifteen treatments were given, and while no cure is claimed, at least the masses were reduced and the patients are still alive, some after three years.

DR. M. LAUTERMAN, Montreal: I would like to add my own tribute of appreciation of this excellent work Dr. O'Crowley has been good enough to bring before us, and I just want to refer to one condition that has not been spoken of this afternoon. May I first of all ask Dr. O'Crowley if he really meant to say that traumatism was an exciting cause? He said that traumatism was a predisposing cause. I wonder if he meant to say that it was an exciting cause. My own experience with Coley's serum has been pretty much that of everybody here with the exception of Dr. Robbins; it has always failed me.

I want to refer to old gonorrhœal epididymitis as a predisposing cause of malignant disease of the testicle, and then I want to speak of a case that I did not diagnose, which proved to be actinomycosis, and as far as my knowledge goes it is the only case of ray fungus of the testicle. If you ever come across it, treat it with salvarsan and you will cure your patient.

Dr. Eisendrath has referred to something that I believe to be of very considerable importance, namely, the existence of two diseased conditions in the testicle at the same time, and his reference to symptomatic hydrocele falls quite in line with my own experience, as does Dr. Smith's reference to massive doses of *x*-ray as a means of after-treatment for the prevention of recurrence. No other means that I am familiar with has proven of any value in my experience.

DR. J. S. EISENSTAEDT: I wish to report a case of enormous teratoma of a testis retained in the abdomen. The patient complained of loss of weight, frequency of urination, and pain in the left lumbar region. On examination a suprapubic mass was found, the size of a California orange. The mass was readily detected by rectal examination and ballottement was made out by bimanual examination. I at first thought that the patient was suffering from an abscess or other lesion of an ectopic kidney. On operation this mass was found to be a tumor of the retained testis. The patient recovered from the operation and very promptly was given massive doses of hard *x*-rays. However, metastases in the lungs evidenced themselves on the fourteenth day after operation and the patient died on the twenty-eighth day.

DR. O'CROWLEY: I wish to thank the gentlemen for their flattering remarks and generous discussion. I remember the case Dr. Stokes mentioned, and that was when I was first dabbling in teratomas. We still believe that was an alveolar carcinoma of embryonal origin. Those mushy tumors, particularly where you

get a gelatinous fluid, outside of the possibility of a dermoid cyst, would be colloid material in an encephaloid. I have never seen a double teratoma with involvement of the other testicle. Dr. Robbins' case shows metastasis a great deal more rapidly than any of the cases I have seen. We used Coley's fluid in three cases. In one case we used twenty-five or twenty-six injections. It did absolutely no good, and that has been our experience in sarcoma and carcinoma in other parts of the body. Dr. Read brought out a point which is very pertinent, and that is to have an immediate operative diagnosis. If you are where you can have a diagnosis made at the time you are going to do an orchidectomy, if there is no evidence of metastasis in the abdomen or elsewhere, have a section made then, and if it is diagnosed as malignant, make up your mind it is teratoma and go on and do a radical operation. Dr. Fowler spoke about the inguinal glands. It is not the inguinal glands that are involved; it is the lumbo-aortic glands. Dr. Smith's experience with Coley's serum is about the same as I said I had had. I think six of these cases gave a definite history of trauma. Whether that is a predisposing or an exciting cause, I think it would set up a spermatogonia. I wish to make a plea for a more thorough study of testicular growths.

RELATION OF MEDICAL TUBERCULOSIS TO THE URINE.

VICTOR COX PEDERSEN,
NEW YORK.

This brief report was suggested by the finding of tuberculous lesions in the bladder of a case of medical tuberculosis and by the variability and uncertainty of tubercle bacilli in the urine of even surgical urinary tuberculosis until usually rather late in the disease. There are three parts of this contribution. The first part is clinical and the sources of the following data have been cases referred to the clinic of the author from the tuberculosis clinics of the Department of Health, late in 1915 and early in 1916. Two factors make the number of patients a small one. It is found that the victims of tuberculosis are either indifferent or rebellious to analysis of their cases, even in the detail of going to a Department laboratory for special sputum study. They therefore are doubly intractable when investigation of their cases is concerned with the urinary system in which they may have noted no subjective symptoms. To this absence of symptoms may be added the unavoidable discomforts of cystoscopy as sources of objection by the patients. Later in 1916 came the epidemic of anterior poliomyelitis, which occupied the energies of the Department of Health staffs to the exclusion of such favors as referring suitable cases of tuberculosis to the author's clinic in urology for men, women, and children, at St. Mark's Hospital, New York.

In general, the basis of selecting such cases was any symptom, subjective or objective, trifling or marked, calling attention to the urinary function. Special importance was assigned to frequency, especially at night, and to pus or blood in even small and relapsing quantities.

The second source of information in this brief study has been correspondence with various sanataria. The writer addressed letters to those which seem to be the most widely known of such private sanataria, chiefly in the United States, but all in North America. It is fitting to express gratitude for the answers furnished by five out of nine addressed. Of these five answers, three have given data as noted below, while the others have stated that no systematic researches have been or are being carried out in their institutions.

The third element of this paper is reference to similar investigations in literature.

In the nature of things, therefore, this report must be a preliminary one, and it is hoped that on a later occasion a larger number of cases will be available for study and publication of the results.

The patients whom the writer has systematically examined have been fourteen from the Department of Health, to which may be added the two individuals in private practice who had lesions of the bladder but who could not be induced to submit to the other steps of the investigation. The Department of Health recognizes the usual three stages or degrees of the disease as the first, second, and third, whose designations had best be stated, to avoid any chance of error.

On this point the Department of Health[1] states as follows: "In reply to your letter . . . I may

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[1] Dr. B. H. Waters, Chief of the Bureau of Preventable Diseases, in a personal communication to the author, May 11th, 1917.

say that this Department employs in its classification of pulmonary tuberculosis patients, the classification which has been in use for a number of years, adopted by the National Association for the Study and Prevention of Tuberculosis, as follows:

"*1. Incipient.* Slight or no constitutional symptoms (including particularly gastric or intestinal disturbance or rapid loss of weight), slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours. Expectoration usually small in amount or absent. Tubercle bacilli may be present or absent. Slight infiltration to the apex of one or both lungs or a small part of one lobe. No tuberculous complications.

"*2. Moderately Advanced.* No marked impairment of function either local or constitutional. Marked infiltration more extensive than under incipient, with little or no evidence of cavity formation. No serious tuberculous complications.

"*3. Far Advanced.* Marked impairment of function, local and constitutional. Extensive localized infiltration or consolidation in one or more lobes. Or disseminated areas of cavity formation. Or serious tuberculous complications.

"*4. Acute Miliary Tuberculosis.* You will find a very interesting discussion of this subject of classification in the first and March number of the *American Review of Tuberculosis*, together with a very valuable modification of it, suggested by Dr. Walter L. Rathbun, the medical superintendent of the Otisville Sanatorium of the Department. As this modification is intended for the use of clinicians especially interested in tuberculosis, you may not care to follow it in your work. If this has not already been done, I believe that it will be adopted by the National Association.

"In this same magazine, you will find under the title 'Medical Notes, Abstracts, and Reviews,' a

number of references to the literature dealing with tuberculosis and syphilis and the Wassermann reaction.

"You are entirely welcome to use the data which have been obtained in one of the tuberculosis clinics of this Department, which are as follows:

Number of patients receiving the Wassermann test		175
Sputum positive	52	
Sputum negative	116	
Sputum not examined	7	
Results of these Wassermann tests:		
Number with four plus reaction	12	
Number with three plus reaction	2	
Number with one plus reaction	7	
Number negative	154	
Percentages of Wassermann reaction, total test:		
Strongly positive (3 or 4 plus)	8%	
Weakly positive (one plus)	4%	
Results of Wassermann reaction in positive sputum cases:		
Strongly positive	9.61%	
Results of Wassermann test in negative sputum cases:		
Positive (4, 3, and 1 plus about evenly)	13.79%	

Subsequent clinical findings confirm the diagnosis of syphilis in all cases giving a strongly positive Wassermann reaction and in some of those showing a weakly positive reaction."

It would seem, therefore, that eight in one hundred patients negative for tuberculosis tests give strong syphilitic tests, and twelve give syphilitic reactions. These percentages about equal those of the author's table hereinafter.

The following table (p. 246) of the author's fourteen cases is furnished by the chief of the Stuyvesant clinic for tuberculosis situated near the author's clinic at St. Mark's Hospital. The writer is therefore indebted to his assistant and himself for the pains, service, and favor represented in the report.

It is to be noticed that of this series of fourteen individuals, one died, not very long after his examination by the author as shown in the following table of such examinations. This is Case III, who had the more marked lesions within the bladder although no bacilli were discovered in the urine. Case XI also died, although without urinary symptoms or signs on cystoscopy. There is a discrepancy in the dates

Name	Case No.	Stage	Sputum	Physical Signs
J. L.	1	II	Pos. 1–24–16	Infiltration right apex and both bases.
A. C.	2	I	Neg. 1– 4–16	Infiltration right apex.
K. M.	3	III	Pos.	Died 12/18/15.
A. U.	4	II	Neg. 11–20–15	Infiltration of both bases.
J. H.	5	II	Neg. 11–29–15	Infiltration both upper lobes.
M. F.	6	II	Pos. 12– 2–15	Infiltration left apex and left base.
J. L.	7	III	Pos. 12–30–15	Infiltration left lung and right upper lobe.
J. S.	8	II	Neg. 2–21–16	Infiltration of both upper lobes.
M. K.	9	II	Pos. 1– 3–16	Infiltration right apex and left base.
F. J. T.	10	I	Neg. 6– 3–15	Infiltration right apex.
F. S.	11	III	Pos.	Died 1/14/16.
I. K.	12	II	Neg. 2– 9–16	Infiltration both apexes.
A. E.	13	I	Neg. 10–22–15	Lesion apparently arrested.
S. K.	14	II	Pos. 1–21–16	Infiltration left lung.

between the clinic record for Case XI and the laboratory and those of the author. The Department reports death on January 14, 1916, whereas the laboratory records are dated January 21, 1916. This is to be accounted for as far as can now be determined at so remote a date by the usual delay in laboratory reports.

The following table (p. 248) is that of the author taken from the laboratory reports as to dates. The case numbers correspond entirely with those of the previous table from the Department. It is to be noticed that Wassermann tests were done on all the cases for the purpose of eliciting whether or not patients with negative tests for tuberculosis might not have syphilis of the lungs. This matter is discussed further in earlier paragraphs of this paper, quoting from the letter of Dr. Waters, and in later paragraphs associated with the author's chart.

In the matter of tubercle bacilli in the urine on analysis and on the guinea-pig test no positive findings whatever were reached among the fourteen cases in hand. This might easily be true in so small a number, especially on the basis of one investigation for each patient, because in the nature of the ignorance and fear of these clinic patients other examinations were difficult to obtain even to the standpoint of returning to the clinic for persistent observation and frequent urinalysis. The individuals were mostly foreigners and they appeared worried by attention to organs and excretions showing them no symptoms. It is the lack of control over such patients that makes research work unsatisfactory.

On the detail of specific gravity, albumen, and casts as signs of compromised kidneys it is to be noted that a low specific gravity was present in only two cases and that even these had none of the other signs, albumen or casts. On the whole the range of the specific gravity was practically normal.

Name	No.	Date	Test for Syphilis (Wassermann)	Uninalysis for Tub. Bacilli	Guinea-pig Test for Tuberculosis	S. G.	Albumen in Urine	Casts in Urine	
J. L.	1	11–18–1915	Negative	Negative	Negative	?	Negative	Negative	?
A. C.	2	11– 9–1915	Negative	Negative	Negative	1021	0	0	?
K. M.	3	11–15–1915	Negative	Negative	Negative	1020	0	0	†
A. U.	4	11–29–1915	Negative	Negative	Negative	1018	0‡	Hyaline	0
J. H.	5	11–30–1915	Negative	Negative	Negative	1018	0	0	0
M. F.	6	12– 4–1915	Negative	Negative	Negative	?	0	0	0
J. L.	7	12–15–1915	††††	Negative	Negative	1021	0	0	‡
J. S.	8	12–29–1915	Negative	Negative	Negative	1007	0	0	0
U. K.	9	1–22–1916	††	Negative	Negative	1019	0	Hyalogranular	0
F. T.	10	1–21–1916	Negative	Negative	Negative	?	0	Hyaline	0
F. S.	11	1–21–1916	Negative	Negative	Negative	1026	0	0	0
L. K.	12	1–26–1916	Negative	Negative	Negative	1006	0	0	0
A. E.	13	2–12–1916	Negative	Negative	Negative	1027	0	0	0
S. K.	14	2–26–1916	Neagtive	Negative	Negative	1018	0	0	0

The occurrence of albumen is very interesting in the face of the rather large percentage of cases showing it in the studies mentioned later taken from literature. Of the fourteen cases only Case IV showed little or a trace in the presence of a normal specific gravity and only a few hyaline casts. This patient could hardly be regarded as having badly damaged kidneys.

The appearance of casts in the urine is exactly what would be expected in accordance with the other elements and they occur only as hyaline and hyalogranular forms in only three cases: Case IV, Case IX, and Case X.

The Ehrlich malignancy test is said to be of value in prognosis of such diseases as tuberculosis in the view of several authorities. Case III who died had it positively, while Case VII with advanced disease had it in doubtful degree. The consensus of opinion is that both the diazo and urochromogen reactions are of no especial value in tuberculosis because in the early stages they are untrustworthy and in the later stages unnecessary.

The cystoscopic findings were negative in all except Case III and Case XII. The former died, and his bladder showed definitely suggestive, if not unmistakeable, signs of early tuberculosis. Case XII had the left ureter reddened at the opening, the right ureter normal and the middle line with reddish spots not unlike early tubercles near the sphincter.

Cystoscopy. I. K. 12. Left ureter reddened at opening; right normal; middle line red spots near sphincter.

K. M. 3. Cystoscopy showed strongly suggestive leslins of the bladder.

One interesting fact is that almost exactly duplicating the record of the Department of Health, one case (7%) had . . . Wassermann test and another a . . . reaction. Two (14%) therefore

had a syphilitic reaction. Case VII had a positive sputum and positive physical signs with his . . . and Case X a negative sputum but positive physical signs.

There are in literature a number of reports and studies on this same general subject, and the contributor is indebted to Dr. Edward W. Preble of this city for research and notes as given below. The following questions were greatly respected in looking up such contributions. The tuberculin reaction was found to be employed freely as ordinary tuberculin and the Von Pirquet's test for control. In the urinalysis the examinations have been concerned in albumen and all formed elements, but there is little mention of urea, total solids, or sugar. The three degrees of tuberculosis are usually mentioned or respected but the fever cases and bedfast cases are omitted. As to the blood, hœmoglobin and the count of red cells were usually taken but there was commonly no Wassermann work. The guinea-pig for diagnosis was very freely employed.

Of a considerable amount of material in literature the following seem to be the best. J. Sturm,[2] writing on Orthotic Albuminuria in Tuberculosis, conveys the general facts as follows.

There is quite a literature on this subject. Several have expressed the opinion that orthotic albuminuria is a good diagnostic sign of early tuberculosis, although, of course, not specific. It is necessary to exclude other causes.

This author has taught that the phenomenon is of toxic origin, called forth by the action of tubercle bacilli which so often circulate in the blood of subjects with pulmonary tuberculosis. The bacilli are deposited in the kidneys and irritate the latter.

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[2] Sturm: *Muench. med. Wochenschr.*, April 8, 1913.

This author has studied a large material of tuberculosis at the Hamburg Sanatorium Edmundsthal and has already published his results in full. In about 70% of all cases he found a connection between tubercle bacillemia and the excretion of tubercle bacilli in the urine. The bacillæmia is responsible for the excretion. In five cases of pronounced tuberculous nephritis, tubercle bacilli were present in both blood and urine, and in six cases of ordinary persistent albuminuria the same findings were present in four cases. In twelve cases of orthotic albuminuria he found positive blood and urine. (In twenty cases examined he found positive data in twelve.) In other words 60% of all cases of pulmonary tuberculosis might show orthotic albuminuria. Luedke and Sturm,[3] who examined 140 cases of pulmonary consumption, obtained the same percentage. Thus 140 + 20 = 160 cases have been examined.

Another contribution is that of Arnold,[4] who, on the other hand, examined forty-nine cases of cutaneous tuberculosis for orthotic albuminuria and found only five cases, each of which gave a local and general tuberculin reaction. In a few other cases he found a tuberculin reaction without orthotic albuminuria. These small returns can only mean that cutaneous tuberculosis is usually local and not a manifestation of constitutional disease. The following suggestive conclusions are offered by Kilbane[5] and are familiar to every urologist of experience: "(1) Many cases of tubercular kidneys exist without causing symptoms. (2) When symptoms do occur they may be referred

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[3] Luedke and Sturm: Die orthostatische Albuminurie bei Tuberkulose, *Muench. med. Wochensch.*, 1911, LVIII, p. 993.

[4] Arnold: This author could not be traced through the records in the New York Academy of Medicine.

[5] Kilbane: Renal Tuberculosis with Occlusion of the Ureter, Trans. Am. Urol. Assn., 1915, Vol. IX, p. 406–7.

to organs other than the kidneys. (3) There is no relationship between the severity or duration of the symptoms and the extent of the kidney involvement. (4) Every case of silent renal tuberculosis may at any time become active or the source of infection of other structures, and therefore (5) Nephrectomy is the logical treatment for uncomplicated unilateral cases, as soon as a diagnosis is possible."

This is a clear summary of surgical lesions, which may be wisely added for definite comparison. In this contribution Kilbane discussed cases of definitely advanced tuberculosis of the kidneys with silent symptoms. If, therefore, surgical disease of these organs may thus work ravages in them with few or little symptoms, it follows that medical tuberculosis of the lungs may cause bacilli to circulate in the blood which the kidneys may filter out without symptoms proceeding from themselves and which the urine may carry away without foci appearing anywhere in the urinary tract for variable and even long periods of time.

As to the incidence of urogenital tuberculosis in relation with other foci, the following quotation from Koll[6] is worth while. All these references are made by Hesse[7] quoted by Koll. The author has had them all traced to their originals, where possible, and has added notations and corrections.

Cornet[8] found in 10,000 deaths from tuberculosis other than pulmonary, 1 per cent urogenital.

Kapsammer[9] found in 20,700 post-mortems one per cent urogenital tuberculosis.

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[6] Koll: Primary Tuberculosis of the Prostate Gland, with the Report of a Case, Trans. Am. Urol. Assn., 1915, IX, 367.

[7] Hesse: Die Tuberculose der Prostata, Jena, Nov. 1913.

[8] Cornet: Die Tuberkulose, II, 1907; also Tuberculose der Prostate, Jena, Nov. 1913).

[9] Kapsammer: Ueber primäre Prostatatuberculose, *Wien. Klin. Wochensch.*, 1899, XII, 1029.

Oppenheim[10] found that in thirty-seven deaths from genito-urinary tuberculosis, thirty had pulmonary involvement.

Reclus,[11] one hundred cases genito-urinary tuberculosis, ninety-eight had lung involvement.

Desnos,[12] sixteen cases prostatic tuberculosis, six had lung involvement.

Julien,[13] forty-one cases of prostatic tuberculosis, twenty-three had lung involvement.

Krzywicki,[14] fourteen cases of prostatic tuberculosis, twelve had lung involvement.

Oppenheim,[15] one hundred cases of prostatic tuberculosis, eighty-one had lung involvement.

Rautberd,[16] one hundred cases of prostatic tuberculosis, eighty-five had lung involvement.

Fenwick,[17] 157 cases genito-urinary tuberculosis, three per cent prostate alone involved (indefinite); twenty-four per cent prostate and epididymis

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[10] Oppenheim: Zur Kenntniss der Urogenital-tuberculose, Göttingen, 1889. He collected notes of sixty-two cases, all he could find to date in Prof. Orth's Berlin material (1876–1889). There is no mention of general tuberculosis or mortality in the paper.

[11] Reclus: Tuberculosis of Testicle, p. 80, in 500 clinical cases of tuberculosis, eleven had genital not urogenital lesions (2%). The other statistics are not in Reclus' work on tuberculosis of the testicle (1876). There was then a general conception of urogenital tuberculosis. Hesse (*loc. cit.*) makes the foregoing quotation without reference. One case of tubercle of the testicle is noted by Reclus in 103 cadavers of tuberculous children.

[12] Desnos: Diagnostic et Traitement de la Prostatite Tuberculeuse, *Rev. de Thérapeut. Méd.-Chir.*, 1895, LXII, 139.

[13] Julien (probably Jullien) could not be traced. Hesse (*loc. cit.*) says Jullien wrote the article on Prostate for the Nouv. Diction. d. Sci. Méd., LXXIX, 1880. This is not indexed in the library of the New York Academy of Medicine.

[14] Krzywicke: Neun und zwanzig Fälle in Urogenital-tuberkulose, etc., Beitr. z. path. Anat., 1888, III, p. 295.

[15] Oppenheim: quoted by Hesse (*loc. cit.*) could not be verified. Possibly same author as footnote 10.

[16] Rautberd: Urogenital-tuberkulose und Meningitis tuberkulosa, Inaugural address, Basle, 1908, quoted by Hesse (*loc. cit.*) but not in the library of the New York Academy of Medicine.

[17] Fenwick: Clinical Notes on the Contour of the Prostate, etc., *Brit. Med. Jl.*, 1899, p. 395 and 396.

involved; two per cent prostate and seminal vesicles involved; six per cent prostate and bladder involved.

Davids,[18] 360 cases of genito-urinary tuberculosis, none primary in prostate.

Hesse,[19] twenty-three cases of genito-urinary tuberculosis, none primary in prostate.

Cabot and Barney,[20] 101 cases of genito-urinary tuberculosis, seventy-five per cent prostate involved.

Guisy,[21] 183 cases of genito-urinary tuberculosis; ten involving prostate and vesicles alone, five prostate alone (record indefinite).

The statistics are significant in showing the relative rarity of urogenital tuberculosis as cause of death or as post-mortem findings, according to the first two authorities named. On the other hand where death or lesions have occurred of urogenital tuberculosis a very large number have had tuberculosis elsewhere, especially in the lungs. This fact brings back again the starting point that probably many cases of medical tuberculosis of the lungs have bacilli passing through the urine without subjective or objective symptoms. Laboratory findings may also be correspondingly rarely positive for bacilli in the urine.

As already stated nine prominent sanitoria in the United States were addressed in this matter with the following results. Five answered more or less

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[18] Davids: quoted by Hesse (*loc. cit.*) as Carl Davids' Inaugural Address, Goettingen, 1908, Beitr. z. Urogenital-tuberkulose. Not in the library of the New York Academy of Medicine.

[19] Hesse: Die Tuberkulose der Prostata, *Centralbl. f. d. Grenzgebiete der Med. und Chir.* XVII, 1913; also Die Tuberkulose der Prostate, Jena, 1913.

[20] Cabot and Barney: Operative Treatment of Genital Tuberculosis, *Jl. A. M. A.*, 1913, LXI, p. 2056, concerned with genital not urogenital lesions.

[21] Guisy: Tuberculose prostato-vesiculaire, *Revue intern. de la Tuberculose*, 1906, X, 81. *Ann. d. Mal. des Org. Gênito-Urinaires*, 1906, Vol. 1.

definitely and four did not report. These are all suggestive although unfortunately not conclusive.

The New Mexico Sanatorium,[22] Silver City, New Mexico, replied as follows: A few years ago they made a study of the urine in all cases of tuberculosis, and found bacilli in a very small percentage of cases. Actual figures could not be remembered of cases in which there were no symptoms of genito-urinary involvement. They are inclined to think that in a certain percentage of cases there is an elimination of bacilli by way of the kidneys.

The Pottenger Sanatorium,[23] Monrovia, California, have kindly reported as follows: "We have not made routine examinations of the urine for tubercle bacilli. It is only when we suspect genito-urinary troubles that we examine for the micro-organisms. We have made a careful study of the feces, however, but cannot determine whether the bacilli passed out of the system through the walls of the canal, or whether their presence is due entirely to swallowed sputum; but we find tubercle bacilli in the feces of practically all patients who have pulmonary tuberculosis. It is possible that we have tubercle bacilli passing out through the genito-urinary tract without infection occurring. I would suspect this from the fact that miliary tubercles may be found so frequently in the cortex of the kidney in tuberculous patients. There is a great deal of difference between infection and tuberculosis of the kidney."

The Grace Lutheran Sanatorium, San Antonio, Texas, offers the following comment. They have no reliable statistics on this phase of the subject of tuberculosis. In examining urine from their patients

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[22] Dr. E. S. Bullock in a personal communication to the author, Feb. 29, 1917.

[23] F. M. Pottenger, M.D., in a personal communication to the author, February 8, 1917.

they do not inoculate animals but only do the usual careful microscopical examination for tubercle bacilli. Their results have been when the tubercle bacilli are positive, there always has been some focus along the urinary tract.

The results of this brief study are not finalities but only suggestions. It is probable that in many cases of medical tuberculosis the bacilli are in the urine without symptoms from time to time. That they are not constantly present is shown by the difficulty of finding them in laboratory work, but as in surgical lesions of the kidney there are probably cases when they are slow to appear.

It is purposed to add to and enlarge this work in the future and it is hoped to reach more definite findings and more conclusive deductions.

FOCAL INFECTION OF THE GENITO-URINARY TRACT.

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The importance of focal infections to general diseases has now become thoroughly established. On account of the many diseases, indefinite, vague, some of more and others of less importance, there is sufficient cause to bring up this topic for careful consideration.

Billings in 1911 pointed out particularly the gums and teeth, the tonsils and throat, pulmonary and gastro-intestinal, and also the rôle of focal infections of the genito-urinary tract in both male and female.

When patients have been shunted from specialist to specialist, and after they have successfully passed through various periods of having their tonsils, teeth, and appendices removed, a certain proportion, possibly only few in number, still continue to complain of the indefinite and vague symptoms for which they originally consulted their medical advisers.

I wish to point out at once that apparently on account of a negative urinary examination, the probability of involvement of the genito-urinary tract has not even been considered. If a more careful history had been taken, signs or symptoms, or both, might possibly have led to the correct source before the patient had been referred to many specialists and before unnecessary operations had been carried out. I do not wish to be misunderstood, but from records on hand I am in a position to show that it has been

done, and that the internist should direct his attention to the class of cases which I will refer to. Besides it will be shown that the urologist may be of help in the cure of these general disorders by giving the proper care and attention to the cure of the focal disorders of the genito-urinary tract.

Furthermore it becomes more apparent from day to day why it is desirable never to discharge, as cured, an ordinary urethral case until every vestige of infection has been removed. I mean by this that every case should be freed from pus in the urine, and also no pus be present in secretion expressed from the adnexa of the urethra. There is no doubt in my mind that there is a tendency on the part of the general practitioner, as well as the urologist, to discharge patients as cured, in order to be credited with rapid results. This is a mistake, as a certain number will always be sufferers, sooner or later, from conditions such as those under consideration.

A review of the literature, particularly of Billings and his associates, and the work which has direct bearing on this subject, has indicated to me that I have personally seen many cases that I can now account for, in which, up to less than a decade ago, the ætiologic factor as now understood was entirely overlooked. It is not necessary to enumerate all the conditions which have thus been accounted for, and in addition many are being added from time to time. This is simply due to the fact that our attention has been drawn and that the investigators are now showing the direct connection between the general disorders and the focal infections.

It is needless for me to refer to all the work done in reference to infections of the genito-urinary tract. This is enormous and exceedingly interesting. However, the investigations showing the direct connections of the character of bacteriological infection and the

character of disease are as yet not voluminous, and are easily referred to.

I wish to refer only to a few instances in each of the various groups which I will take up. At some later date I will tabulate the details of the cases which have been under my personal observation.

Urethra and Adnexa. Here belong both sexual and urinary organs, which are, I believe, as often involved in inflammatory diseases as any other group. Anatomical conditions are such as to easily harbor infection — both of acute and chronic character, and besides the character of the most common bacteriological invader is almost exclusive to these parts. It is true, and I am convinced from accurate observation, that the gonococcus rarely ever remains in a virile state for more than two years and probably never for three years in these organs. The gonococcus does, however, prepare for and easily permits of invasion by other germs. These may remain more or less active indefinitely and are, particularly in the chronic cases of these vague disorders, the bacteriological factor.

In acute gonorrhœal infections of urethra and adnexa or both, septicæmia, endocarditis, arthritis, and synovitis based on gonococcal infection are not uncommon.

In gonorrhœal infection in the male, it is possible, of course, by direct extension to find any or all of the urethral adnexa involved, with vas-deferentitis and epididymitis with co-existing changes of the tunica. Besides, there can be no question of direct extension by way of lymphatics or otherwise, however rare, from urethra to bladder to kidney, both in male and female.

In women naturally there is often involvement of the Bartholinian gland, cervix, and uterus with tubes and ovaries, and consecutively peritonitis.

Prostate. It has been pointed out, and I am thoroughly convinced that there is an active principle, an internal secretion of the prostate, in many instances of enlarged prostate, often in the comparatively young individuals, which is productive of signs and symptoms, and these are often of a pronounced cardiac and vascular type. These are not infrequently accompanied by renal and gastric symptoms. The prostates removed of this type also showed inflammatory changes, and it is a question to me whether the process has not some tendency to increase the activity of the aforementioned secretion and thus produce these pronounced symptoms which, following operation, have all been greatly ameliorated and in some instances entirely relieved. I have seen tachycardia attacks diagnosed as angina pectoris in several instances.

The prostate is undoubtedly if not almost always involved in a chronic urethral infection. I have nearly always found bacteriologically either the streptococcus or staphylococcus, and never the gonococcus in chronic involvements of the prostate of more than two or three years' duration. Never have I found the gonococcus except in comparatively recent infections; the colon bacillus in but few instances.

I am convinced more and more that the seminal vesicles are equally often involved as the prostate, and bacteriologically identically; furthermore, that many of the remote troubles under consideration have them more often or fully as often as the prostatic infections, as their cause. It must be admitted that as a rule both vesicles and prostate are involved at the same time. For this reason if operative work is undertaken all structures involved should in most instances be operated upon.

It has been noted that the utriculus becomes infected. It gives rise to many urinary and

seminal troubles, but referred troubles are not at all uncommon.

It must be admitted that neuroses and psychoses are frequent accompaniments of inflammatory involvement of prostate, verumontanum, and vesicles. Besides, neuralgia, chiefly of the sciatica, is not uncommon. Pain in sacroiliac joints or regions and pain referred to as lumbago are unusually common. Besides there may be pain in the abdomen of such character that the attacks simulate ureteral colics or appendiceal attacks.

Finally inflammatory involvement of the vasa deferentia and epididymes is constantly seen. Of course this is accompanied by involvement of the urethral adnexa.

Bladder. Is frequently inflamed, but as a rule infection is also present elsewhere. However, in several instances of ulcer of the bladder, with cystitis, I can recall remote troubles which were improved by local treatment of the ulcers.

Kidney and Ureters. These certainly must be regarded as organs which are easily involved in various forms of infections. I need not go into the anatomical, pathological details to show that this is true. Myocarditis and endocarditis are certainly sequelæ. Streptococcic infections are less common than colon bacillus and staphyloccus, and for this reason it has been supposed that chronic arthritis is seen less often in these cases than in infections of other genito-urinary organs where the streptococcus infection is more common.

The object of bringing up this matter has been to again put before the urological profession the necessity of not permitting ordinary urethral infections or infections of the genito-urinary tract to become localized, or to become focal infections, which in their turn become foci of infections, which in turn are then

the cause of many diseases, indefinite, vague, some of more and others of less importance. Also, when patients suffering from diseases of this nature present themselves, detection of the foci of distribution should be insisted on in order to stamp out their ill effects. Furthermore, the attention of the medical profession should be directed to the fact that the genito-urinary tract should not be overlooked and that the urologist is capable of being of great help in many instances.

In my opinion it is not sufficient to find one focus of infection to account for all troubles, but one should remember that foci of the teeth or tonsils may also be accompanied by foci of infections of the genito-urinary tract. For this reason there must be better co-operation on the part of the practitioner and the urologist.

Here as elsewhere in the body it is true that the virulence of the micro-organism, the duration of the focus, the extent of involvement, the rapidity of absorption, and the susceptibility of the individual must all be considered.

THE INTRAVENOUS AND INTRAPROSTATIC INJECTIONS OF METHYL-PHENOL AND NORMAL PHENOL SERUM IN GONORRHŒA.

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Since the discovery in 1879 of the gonococcus as the specific cause of gonorrhœa, all physicians and scientists interested in this germ and its effects have directed their studies and experiments toward its destruction in the human body. Every theory of treatment has been proven, apparently, by a greater or lesser number of brilliant clinical results, yet each scheme, upon trial, has resulted in so many lamentable failures as to demonstrate our long distance from the ideal which we sought to find.

To the thoughtful physician it must be clear that the multitude of gonorrhœal complications and the numerous sequelæ of the disease are not due to the germ alone. Many such misfortunes may be attributed to reduced vis naturæ, to disobedience of instructions, and to various other factors, but there still remains a large number which cannot be explained on any such premises. We must assume, therefore, that the fault lies in our method of treatment. This reasoning is proven to be accurate by

the numerous methods and modes of treatment, whose description permeates our medical literature. It has not been possible to adapt the views of the irrigationist to those of the autogenous vaccine enthusiast, nor to dissuade the zealot from certain gonococcicidal agents to an expectant plan of treatment. Hence we must deduce that, unlike other well-known and easily recognized diseases, there has not hitherto been any well-expressed basic principle upon which a uniform treatment of gonorrhœa could be founded.

An important desideratum in the treatment of gonorrhœa is the selection of a therapeusis which shall not be worse than the disease; that is, the selection of the best method of treatment, or one with which the fewest and least serious complications occur.

In the search for a foundation upon which the superstructure of a scientific and uniform gonorrhœal therapy could be erected, one of us (Cano) started with the accepted works of Pasteur, Bernard, Richet, and later authorities on chemical biology. Further stimulated by Ehrlich's brilliant works and successes, he constructed a theory of therapy in absolute conformity with their teachings. As a result of two years' laboratory work, he produced a definite chemicobiological substance known as methyl-phenol serum, and, after proving its safety by exhaustive animal experimentation, he applied his theory, and he used the medicament in more than three thousand private and hospital patients. The results are published in the *Archives of the Rosales Hospital*, in 1910, and in November, 1913.

Four years of clinical experience with this method enables him to summarize as follows: (1) The treatment of gonorrhœa by intravenous injections of this medicament until the disease reaches its declining stages prevents complications; (2) pain, discomfort,

and all other subjective and objective symptoms usually disappear after the fourth or fifth injection, and definite clinical and bacteriological cures are effected in from thirty to forty days; (3) ten injections are usually sufficient when the infection is attacked at its onset; (4) gonorrhœa, when complicated by primary or secondary syphilis, successfully responds to the treatment if additional anti-syphilitic medication is employed; (5) local complications, such as epididymitis, buboes, abscesses, etc., together with systemic manifestations suc has toxæmia and the paragonococcal lesions (arthritides), disappear more rapidly with this form of treatment than with any other, and surgical interference is rarely necessary; (6) by the use of intravenous and intraprostatic injections of the serum, months, not years, are required to cure chronic residual prostatic gonorrhœa and its numerous recrudescences.

In the *New York Medical Journal* of June 5, 1915, Dr. William F. Bernart of Chicago presented an introductory essay on the intravenous use of antiseptics in the treatment of gonorrhœa. He used borophenylic acid and sodium benzoate, and from his clinical experience he drew a number of conclusions which corroborate those of Cano.

An intravenous injection of 10 c.c. of methyl-phenol serum, or an intraprostatic injection of normal phenol serum, is non-toxic. In no manner does it jeopardize the recipient's life or produce any deleterious effect. Its rôle is that of an antiseptic, and its effects are due to the action of phenol on the gonococcus and its toxins at the site of infection (locally), and within the body (systemically) through the blood stream.

Phenol, as a chemical, belongs to the aromatic group, and on account of its composition fills a double rôle; as an acid (phenol) and as a base (by

its radical, phenyl). It is very unstable in combination, it is easily liberated, and it is disintegrated *in vitro* as well as within the body, as shown by the manner in which it easily combines with the fatty acids, glycerins, and ethereal oils in *statu nascenti* in the intestine, breaking up and giving off phenol or phenyl (radical), thus exerting its antiputrefactive and antifermentative action by its energetic oxidizing powers on the soluble and insoluble organic ferments and by its coagulant action on the albumins, toxalbumins, etc, etc.

The action of phenol is beneficial in such combinations because its direct action is modified or attenuated. It acts indirectly on the elemental anatomical cells, on the blood globules, and on the soluble or insoluble normal organized ferments.

A concentrated or a weak solution of chemically pure phenol has a direct action on the red-blood corpuscle, at first paralyzing its chemico-biological components, and causing its deoxygenation, its disintegration, destroying its coloring matter (methæmoglobin), and finally causing hæmolysis (hæmoglobinuria).

In the slowly progressive phenol toxemias capillary hemorrhages are hæmolytic and not congestive. In acute phenol toxæmia following doses of from two to five cubic centimeters the picture changes, and the toxic action is exercised on the nervous and circulatory systems. Its action on the red-blood corpuscles in this instance is secondary, since here the phenomena manifest are those of total coagulation of the blood and those of nervous inhibition. This is proven by the intravenous injection of methyl-phenol serum, which causes certain regular classical phenomena due to cerebrospinal reflexes: first, on the nervous system, as shown by the buzzing in the ears, vertigo, and pallor in some cases, and by reflex congestive

symptoms, such as flushing and œdema, in others. Its action on the circulatory system may manifest itself by a slight depression of the pulse and a slight weakening of the systolic or diastolic cardiac beats for a period of three to ten minutes. Respirations usually remain normal or they may become slightly more shallow.

The presence of methylene blue in this product is of extreme importance. This substance acts as a protector to prevent the phenol from exerting its direct action on the red-blood corpuscles. It has a refractory chemico-biological action, and exercises no vicious effect on the red-blood corpuscles in the circulation; but, on the contrary, by its inoffensive presence, it wholly preserves all of the physiological properties of the blood. Even in saturation this substance has no detrimental effect on the cellular elements of the blood, as proved by animal experimentation, which shows rapid elimination through healthy kidneys. Therefore, methylene blue possesses the double value of preserving the antiseptic powers of phenol and of preventing its direct action on the chemico-biological function of the red and white blood cells.

By its stimulating action the serum re-enforces the power of the phagocyte, promotes lymphocytosis and transient leucocytosis, which prevents the destroying action of the annihilated phagocytes, and maintains the normal tenor of the internal secretions that are always altered by a general infection.

Phenol, introduced in the organism in any other form than that of methyl-phenol serum, produces direct consecutive chemical action on the red-blood cells (hæmolysis, anaphylaxis); and it also exercises a direct action on the normal ferments and internal secretions, which in turn cause characteristic organic processes by bringing about changes in assimilation

and disassimilation, as manifested by congestion, hemorrhages, depression, anorexia, etc., all more or less accentuated by the individual's resistance. The action of phenol varies when introduced by the digestive tract, subcutaneous, or intramuscular routes, because it is altered by its elective and chemical affinity for the organic chemico-biological elements in its process of absorption. Studying the subcutaneous, intramuscular, and digestive routes, we shall see the value of the intravenous method of administration. When ingested in liquid or administered in solid form, its modification begins in the intestines by action of the fatty acids, one part exerting a local effect, elimination occurring by way of the feces, the other absorbed in substance, firstly the radical phenyl and secondly pure phenol, which becomes transformed into sulpho-conjugates, in which form it is thrown off. Elimination is relatively slow, especially through the kidneys, whence we see its real antiseptic value is lost in this method of administration.

Its chemico-biological action is multiple and varied, depending upon the factors influencing its transformation and upon the organoleptic reaction in its stage of sanguino-lymphatic absorption. Its rôle thus is insufficient to be of benefit as a true antiseptic at its objective point, and its action is more ephemeral and inconstant.

By the intramuscular and subcutaneous routes it is absorbed in greater part by the lymphatic system, and in its passage through the lymphatic organs undergoes a constant and increasing modification by its elective powers on the lymph, which is rich in fibrinous elements and albuminoids, and with which it has positive chemical affinity. This may be proven by post-mortem extirpation of lymph nodes from acutely intoxicated dogs, in which lymph nodes is found the maximum of the drug and its

combinations. This explains the diminution of its chief factor for good, viz., its antiseptic value.

In the intramuscular and subcutaneous injections of methyl-phenol serum, the phenol, besides producing an intense local inflammation with its accompanying symptoms, and in some instances a general systemic reaction, has a more or less toxic action manifested by gastric intolerance, intestinal disturbances, nausea, vomiting, vertigo, chills, sweats, collapse, ringing of the ears, depression of the pulse and respiration, which may last for from a few hours to days.

Phenol administered intravenously in combination with methylene blue, to protect the red-blood globule, undergoes no change, and preserves all of its actual antiseptic effect on the gonococcus and its toxins as though employed in the test tube. We thus benefit from the organic elective action by chemico-biological affinity on infected lymph organs and their secretions. When thus introduced into the human body its elimination is unique, effective, antiseptic, germicidal, being completely and exclusively thrown off through the kidneys in a period varying from one-half to twelve hours without local injury or disturbance to the general economy.

The phenomena of repair are those of which we should take advantage for the phagocytic defense and the balance of stable assimilation and disassimilation. The urine proves this by chemical and cytological examinations, hence the interval of forty-eight hours has been proved to be the proper period between injections without interfering with the evolution of renewed economic defense. Anti-anaphylaxis of the medicament is accomplished by the correct technique of its preparation without the loss of the phenomena of defensive reaction. These phenomena are twofold: first, phagocytic and opsonic, produced by seric stim-

ulation; second, by the inoffensiveness of phenol as proved by its therapeutic equivalent of 0.5, the toxic intravenous dose being 1.5 to 2.0.

Here emerges the important question, how does methyl-phenol serum act on the gonococcus and its toxins?

Its mode of action is threefold: first, locally at the site of injection; second, in the blood stream; and third, during its elimination. It possesses the three indispensable requirements: first, it does not attack the red-blood corpuscle; second, it preserves its antiseptic and germicidal and antitoxic action at the site of infection and in the blood stream, and at the time of its elimination; third, it produces no ill effects in the body. Bearing in mind the pathology of a gonorrhœal process, it is patent that the medicament is carried to the innermost tissues in the sanguino-lymphatic evolution, exercising by endo- and exosmosis a direct antiseptic action on the germ and rendering a field unfavorable for its reproduction, thereby strengthening the defensive powers of the infected tissues.

Besides possessing this chemico-biological and therapeutic essential it has the advantage of not becoming modified during its evolutive process, and thus its action is potent, though safe, up to its elimination, which in greater part is through the genito-urinary tract, occurring from one-half hour to forty-eight hours after introduction into the circulation.

Combinations of phenol are unstable, but they do have the advantage of mitigating direct action on the cells and globules. It is also known that ordinary phenol has a *coagulant action* on the albumins and an *oxidizing power* on the tissues, which power, if permanent, produces gangrene. By virtue of this dual action it therefore acts as a *modifier;* by its oxidizing

power on the germ it is germicidal and prevents the growth of the gonococcus; and by its coagulant power on the toxins it relieves paragonococcal lesions (mono- and poly-arthritides) and affections of the serous organs (endo- and pericarditis, meningitis), and some definite systemic disturbances, the pathology of which is often confused with that of other infections.

In addition, methyl-phenol serum has a general and local sedative action (Ehrlich) by virtue of methylene blue, which acts as a protection for the red-blood cell and prevents hemolysis.

The serum component of the product acts therapeutically: (1) By favoring the phenomena of positive chemiotaxis, it strengthens the bodily defense against infectious processes; (2) it prevents anaphylaxis and violent reactions, even in debilitated persons; and (3) it replaces the phenomena of resistance to all the internal secretions which have been impaired by the demands of the processes of defense and by insufficient elimination.

Methyl-phenol serum is a chemico-biological product, in which the phenyl group and free phenol act chemically as antiseptics and the serum as an opsonisant, thereby fulfilling the two indispensable requirements for the fight against the germs and their toxins.

Following its use, the leucocyte count varies with individual resistance, but in general is increased. Lymphocytosis is often persistent in some individuals in whom the internal secretions and the processes of assimilation and disassimilation are deficient; and because of the lack of these the organic physiological ferments are insufficient for the mechanism of nutrition and the phenomena of hæmatopoiesis.

We desire in this paper to present the clinical results from the use of this medicament and to call

attention to its value in conjunction with other accepted agents in the treatment of gonorrhœa.

Methyl-phenol serum is not a panacea, nor can it work miracles; hence judicious use, with full understanding of its action, is essential to success.

That the economy will tolerate to a surprising degree substances directly introduced through the blood stream is now well known. By the intravenous injection of 10 c.c. of methyl-phenol serum we throw into the human body a massive dose of an alien substance. The immediate effect of this injection is upon the central nervous system. The recipient usually becomes either pale or suffused, he has a ringing in his ears, has a sensation of great altitude, and occasionally has a dryness of the fauces and a metallic or a garlic taste.

In some patients, secondary reactions occur in from one to four hours after injection. The phenomena we have observed in these secondary reactions are pronounced chill and rigor, febrile elevation, and even some joint pains. None of the reactions were prolonged nor did they give anxiety.

Based upon the rapidity of elimination of the medicament, as hereinbefore explained, the injections should be administered every forty-eight hours. If the reaction from the preceding injection should be unduly severe, or if evidences of continued elimination appear in the bluish or greenish color of the urine, the injection may be postponed for another twenty-four hours. We have observed that after ten intravenous injections have been given at regular intervals, no beneficial results will follow further administration.

The frequency of gonorrhœal prostatitis is so great that it can be looked upon as part and parcel of every clap infection. The interdependence between gonorrhœal urethritis and prostatitis is so intimate that

vigorous and immediate attention to the infected gland is imperative.

As soon as the extension of the infection is recognized, the second stage of the dual attack is at hand. This consists of direct injection of normal phenol serum into the prostate gland. The solution thus employed is phenol in anaphylactic serum.

The histopathology of gonorrhœal prostatitis shows, among other changes, the presence of a number of abscesses varying from frankly palpable size to microscopic areas. This disease change in part explains the curative effect of the serum injection. As in the systemic injection, phenol (1) by its oxidizing powers directly kills the gonococcus, and at the same time nullifies the action of its toxins; (2) it renders the culture ground inhospitable to the germ; (3) the local defense is fortified by the serum; (4) local phagocytosis and the immediate supply of red-blood globules are increased; and (5) because of the suddenly increased intracapsular tension, the medicament is mechanically and in part osmotically disseminated throughout the glandular tissue, thereby coalescing the small pus collections into one or more large aggregations and facilitating its expulsion or absorption. After intraprostatic injections of amounts from 20 c.c. to 60 c.c., we have observed reactions of various degrees of intensity, though as a rule little or no systemic effect is to be observed. Owing to an increased intracapsular tension, the patient usually complains of an increased desire to urinate and defecate. These annoyances rarely continue longer than ten to twelve hours. Following the puncture of small blood vessels he may observe blood-tinged urethral discharge or blood-tinged urinary filaments or minute terminal hæmaturia lasting from three to ten days.

Systemic reactions are observed in from 2 to 5 per cent of cases and may be severe. The factors

inducing and accentuating these severe reactions will be discussed later.

The systemic reactions following intraprostatic injections may appear within a few moments after the injection or not until several days. The phenomena of reaction are chills, fever, urticaria, pain in different joints, and marked bodily depression. In some cases angioneurotic symptoms predominate. Such sequelæ, or serum sickness, are no doubt but a species of anaphylactic shock.

The severity of the reactions to methyl-phenol serum seem to be in direct ratio to the presence and degree of the patient's autointoxication, and to the derangement of his internal secretions or metabolic functions. Chronic alcoholics have had severe reactions and those patients with sluggish livers and foul intestines have had those of somewhat less severe degree. We have further observed that those patients suffering from a mixed gonorrhœal and strepto- or staphylococcic infections and their sub-forms, or from *micrococcus catarrhalis* infections have reacted more severely to the medicament than have those with purely gonococcic infections.

Post hoc, propter hoc, thorough and careful elimination is of paramount importance. Since severe reactions do not spell increased efficiency of the treatment, avoidance simply lessens the patient's discomfort. In line with this thought, careful attention to diet is essential. Liquids and easily digestible foods are best borne. Meat-free diet particularly is to be recommended.

Whenever possible we have attempted to anticipate the anaphylactic shock and to reduce the severity of the reactions to intraprostatic injections by preliminary catharsis, diet, and intravenous injections of methyl-phenol serum. This preliminary preparation has been justified by our observations.

The contraindications to the intravenous and intraprostatic injections are: (1) advanced nephritis, (2) extensive organic cardiac lesions, and (3) autointoxications. These maladies must be present in a pronounced degree to constitute contraindications, since we have repeatedly treated by the aforesaid injections with good results nephritics, rheumatics with mitral regurgitation, and one acute tuberculous man.

The technique of intravenous injections of methylphenol serum is simple. With the patient recumbent, an area of skin over the most prominent vein in the median basilic region is iodinized; a Luer syringe containing 10 c.c. of the medicament is freed from air bubbles and armed with a 2 cm. 26 gage platino-iridium needle; the needle is pushed into the lumen of the vein and the serum is very slowly injected. About 50 to 60 seconds should be taken to inject. During the injection the patient should be instructed to breathe deeply, thereby allowing the red-blood corpuscles to oxyhæmoglobinize themselves completely, which function the medicament has a tendency to inhibit slightly.

Precautions. The patient must be recumbent; the syringe, needle, operator, skin area, and medicament must be aseptic; the syringe and medicament must be free from air bubbles; the needle must be platino-iridium, not steel; and the patient must remain recumbent until he has recovered, usually from two to five minutes.

The technique of intraprostatic injections is less simple but by no means so difficult or complicated as to place it exclusively in the catagory of the urologist. The patient is placed in the lithotomy position and the perineal triangle is shaved and iodinized. The middle finger of the left hand, appropriately clothed in a rubber covering, is inserted into the

rectum and hooks above the gland. The scrotum and testicles are retracted above the pubic arch. The needle, which would be about 7.5 cm. long and of 19 mm. gauge, is held firmly in the right hand and inserted into the perineal body in the raphé about 2 cm. above the anus. This avoids puncture of the rectum or bulb. The location of the point of the needle can be determined by the rectal palpating finger and thus is guided into the central portion of one lobe, or into the most prominent elevation of the prostatic enlargement. We have seen abscesses thus tapped spout forth free pus with such force as to establish a perfect parabola. If free pus exudes it should be permitted to drain away before injecting the serum. If an appreciable amount of blood flows through the needle, the position of the point should be altered to avoid direct injection into the circulation.

Depots of serum should be deposited throughout each prostatic lobe by slight withdrawal and reinsertion of the needle into different areas of prostatic tissue after injecting in each 4 or 5 c.c. Due care should be observed not to change the general horizontal plane of direction.

The amount of serum adequate to produce the physiological effect varies, in general 10 to 15 c.c. per lobe suffices. Other cases demand more; the largest amount that we have injected into any single prostate was 60 c.c. A good working rule is to inject an amount sufficient distinctly to balloon the prostatic capsule.

After one lobe has been injected, it is necessary to withdraw the needle only partially until it is free from the capsule, when its mobility will allow of its insertion into the opposite lobe without piercing the perineum a second time.

Only two of our patients demanded narcotization. These were men who submitted to second injections

and whose characters did not comprehend the virtue of fortitude. The pain is quite tolerable without anæsthesia.

Clinical result is the Supreme Court in the art and practice of medicine and the clinician is the Supreme Judge who pronounces the decision of success or failure on every method, procedure, and medicament which presents or evolves in our inexact science. Therefore we lay this medicament and procedure at this bar for judgment.

In acute gonorrhœal infections we have observed a diminution of acuity of inflammatory symptoms after the first few injections. Lymph nodes diminish and become painless, chordee and lymphangitis disappear without the application of any external antiseptics or gonococcicides, after which urethral and vesical lavage become more effective than when immediately instituted according to our earlier beliefs. Complications have been rare in virgin cases.

We have observed almost magical improvement in subacute gonorrhœa following intravenous and intraprostatic injections. Disappearance of grouped gonococci after the first intraprostatic injection or complete disappearance of all infectious micro-organisms after the second is not rare. Periurethral abscesses, when present, diminish and unless well-established have not required incision.

In gonorrhœal rheumatism we have by the combined treatment accomplished functional cure in one month. Other cases more chronic in type were only improved.

After a series of intravenous and later an intraprostatic injection, the inflammation takes on a benign character. The hitherto free discharge diminishes, irrigations are more effective, and instrumentation is well borne. The surgical dictum to withhold instrumentation from a urethra exuding pus no longer

obtains. On the contrary, a thorough lavage of the lower tract with mild solutions introduced into the bladder through a soft rubber catheter are painless and immediately beneficial. This is due to the gonococcicidal properties of the preparation and its coagulative powers on the toxins of gonorrhœa, and in part to the sedative action of methylene blue.

Incipient epididymitis has been aborted in each patient who presented with this complication, and we have not performed a single epididymotomy (Hagner) since using this method of treatment.

The most rapid cures were in those patients who presented violent local reactions following intraprostatic injection. The gland became larger and harder and gave some evidence of acute inflammation. This condition differed, however, from acute gonorrhœal prostatitis in that it was painless, afebrile, and ran a much shorter course. After a few days' rest the patients showed marked improvement in all morbid symptoms and rapid transition from turbid to clear urines.

Following a series of injections, the patients have all declared that they felt much better, which experience coincides with that following intravenous injections of the arsenicals. Their general appearance improves and their weight increases. This happy condition may be explained in part by their being obliged to eliminate properly during treatment, by the stimulant effect of the injections on the hæmatopoietic system, and the neutralization by coagulation of the toxalbumins sequential to gonorrhœal infections.

The use of methyl-phenol serum in combined gonorrhœal and syphilitic infection does not give brilliant results unless the syphilis is controlled by appropriate treatment; then the usual beneficial results of serum injections become apparent.

Very gentle and very mild local treatment is essential to success. In the first few days of acute inflammation no urethral irrigations should be administered. When acute symptoms begin to subside, usually after the third or fourth intravenous injection of methyl-phenol serum, irrigations of the anterior urethra with weak antiseptic solutions, *e.g.*, oxycyanide of mercury 1-5000, or nitrate of silver 1-5000, are in order. Our constant endeavor should be not to traumatize by brusque manipulation or to cause epithelial denudations by strong gonococcicidal drugs.

Under this method of treatment complicating epididymitis, periurethral abscess, and the dreaded vesiculitis with its attendant rheumatic sequelæ are not encountered. This is due not only to the biological action of the serum as before explained, but also to the increased defensive powers of the urethral adnexa and the avoidance of insult to the tract by the unskillful use of strong antiseptics.

Aside from the extensive use of the medicaments in Dr. Cano's practice, we have administered between six and seven hundred intravenous injections of methyl-phenol serum and sixty-seven intraprostatic injections of normal phenol serum in seventy-three selected private and hospital patients. It is from the latter series of injections covering a period of almost one year that we have made our clinical observations and deductions that are contained in this presentation.

Conclusions.

1. Methyl-phenol serum may be repeatedly injected intravenously in doses of 10 c.c. into adults at intervals of forty-eight hours without danger or detriment to life or health.

2. Its use has a tendency to prevent complications by killing or rendering inert the invading gonococcus at the site of residence.

3. For the same reason and because of the neutralization of gonotoxins it shortens the course of gonorrhœa and alters a vicious into a benign infection.

4. Its use causes general increased economic resistance, hence gonorrhœal sequelæ are rare.

5. Intraprostatic injections of normal phenol serum are harmless when correctly performed, frequently cause a rapid disappearance of gonococci from the prostatic secretion, and invariably shorten the time required to cure chronic gonorrhœal prostatitis.

6. The treatment of gonorrhœa by Cano's theory of intravenous injections of methyl-phenol serum and intraprostatic injections of normal phenol serum is firmly based upon chemico-biological facts and accepted authoritative theories and bears the same relation to gonorrhœa that intravenous injections of arsenicals bear to syphilis.

7. This is the first application of the immutable laws of chemico-biology to gonorrhœal infection, which application forms the basis for a scientific and uniform treatment of gonorrhœa.

DISCUSSION

OF PAPERS OF DRS. SCHMIDT AND VALENTINE.

DR. M. LAUTERMAN, Montreal: Referring to Dr. Schmidt's paper, I think we all realize how very timely his suggestions are. Just before leaving home I had under my care a young man of nineteen who, recovering from a very acute follicular tonsillitis, developed an epididymitis. Now this young man had never been exposed. He had absolutely no evidence of any urethral or genital infection, and yet he had an epididymis that contained pus and which gave a pure culture of staphylococcus pyogenes aureus. In referring to the subject of cure, Dr. Schmidt emphasized the importance between symptomatic and clinical or absolute cure. I think that we should bear these points very well in mind, and, while I am free to admit that in my own work where the average patient usually runs away when he has procured a symptomatic cure, that the ideal we should all strive for is not only a symptomatic but a clinical cure, as confirmed by microscopic and bacteriological data.

I think, if I may be permitted, that Dr. Schmidt rather involved his contribution by referring to the internal secretions. I do not believe that the internal secretions are to blame in cases in which we have at the same time infections, especially focal infections. There is no doubt that our knowledge of the effect on the organism of the internal secretions or the disturbance of the ratio of one secretion to another is more or less an unknown field to many of us. I know it is in a great measure to me, and that there still is a great deal of room for conscientious study in that field. But I think that when we have a distinct infection, that is probably more plain than any disturbance of the normal secretions.

As regards Dr. Cano's paper, as presented to us by Dr. Valentine, I do not recall having had the good fortune to listen to such a thoroughly worked out, such a classical contribution. Naturally I know absolutely nothiug about the work, but it looks exceedingly interesting, and I trust that I, in common with the other members of this Society, will have an opportunity of trying this new serum in my own work, and it is just barely possible — we hope so, I am sure — that Dr. Cano has given us the solution of a problem that has taxed us for a great many years.

DR. P. E. MCCOWN, Indianapolis: I think we should thank Drs. Cano, Valentine, and Townsend for their valuable contri-

bution, and I may say that while nobody here can deny the efficacy of this method, we are waiting with great interest an opportunity to use the preparation. Dr. Schmidt's paper was particularly interesting to me because I have had an opportunity to observe the effect of focal infection upon the kidney, happening recently to have had a number of infected kidneys, pyelonephritis, or kidneys simply presenting nephritic symptoms. We have begun to take notice of hæmatogenous infection of the kidney and likewise the lymphatic relations from the lower urinary tract — I think Dr. Eisendrath has demonstrated their rather close lymphatic connection — also their rather intimate lymphatic connection with the intestinal tract. In catheterizing the ureters we have found numbers of these bacteria in the urine. I invariably make cultures of the urine, whether or not it presents macroscopic pus, and have secured bacterial cultures from apparently clear urines and in urines presenting albumin and casts. Since the idea of focalized infection has become of greater general interest I have looked for the source of infection in other parts of the body, and have had a number of interesting finds. In one instance we discovered the same organism in the tonsil that we found in our culture from the urine. We found in another instance the same organism from the root of a tooth that we found in our culture of the urine. I have had just recently a case of a young man with one of the most severe involvements of the seminal vesicles from gonorrhœa that I have ever seen. He was in bed some two or three weeks. His heart became considerably involved, and after recovery we found albumin and casts in his urine. Now we had not had an opportunity to make an examination before his infection, but suspecting this vesicle, its intimate relationship with the lymphatic channels along the ureter, we immediately placed him on about forty grains of urotropin a day. In three weeks this condition had cleared up, during which time the vesicle was fairly well emptied. We had him under observation three months since, and I believe we were simply dealing with a focalized infection in which the kidney had become involved. The urine did not present any macroscopic pus.

DR. CHARLES MORGAN MCKENNA, Chicago: I believe that Dr. Schmidt's paper is a most important one and is a subject that deserves the greatest attention and thought of everyone present. It is my opinion if genito-urinary men would give as much attention to focal infection in their particular line of work as do the ear, nose, and throat men in their work, our results would be much different. It is not uncommon for a patient with

rheumatism to call on the throat specialist seeking information, and he immediately advises the removal of tonsils whether they are infected or not, assuming that the tonsil is the base of some focal infection.

Another point of importance, which I feel is much overlooked, is focal infection without symptoms. These occur and I believe often. This is especially true of the prostate gland, seminal vesicles, and the kidney pelvis. These infections are usually let go for a long time without a definite diagnosis and when the diagnosis is made, the disease is well advanced and the treatment lasts over a long period of time.

I would like to report a case of a man sixty-two years of age, a clergyman, without any venereal history, with all the symptoms of arthritis deformans. His symptoms had steadily grown worse for the past two years. He had his tonsils removed and his teeth examined and *x*-rayed without any relief. On rectal examination secretions from the prostate gland and seminal vesicles showed a mixed infection. The gland was soft and very large. After the necessary preparations, a superpubic prostatectomy was done with most gratifying results; three months after this operation the patient reported at my office without any symptoms in any of his joints and was enjoying perfect health.

Conclusion: I think it is time that the genito-urinary men, as a body, should teach the general practitioner more about focal infection and the necessity of frequent examination of urine. By so doing, a great good will be accomplished for all of us.

DR. H. L. KRETSCHMER, Chicago: I think that since the advent of focal infections we should not forget that the genito-urinary surgeons were in the field just as early or possibly before the internists. We are all familiar, of course, with the early work of Dr. Fuller on the seminal vesicles as being a focus of infection in arthritis. Second, I think that one of the points in Dr. Schmidt's paper that should be emphasized more perhaps than it was, is the fact that there may be multiple foci of infection. Usually when a patient has arthritis the nose and throat man looks in the throat and finds something wrong with the tonsils. If the patient does not get better another focus is looked for, and so on. When a patient comes to the genito-urinary man he looks at the prostate and vesicles and immediately treats them. They make the same mistake that the nose and throat men make. We ought to subject these patients to a complete overhauling, teeth, tonsils, sinuses, and genito-urinary tract.

In this connection, I should like to mention just one case that

came to us in which a young boy came in with symptoms of pyelitis. We isolated the streptococcus viridans from the kidney urine per catheter, the same organism from the blood, and also from two of his teeth. I might add that the patient came in with a pyelitis, but he really was a case of malignant endocarditis. This case illustrates the value of looking not only for one focus, but in a complete examination in order to exclude the possibility of multiple foci.

DR. TERRY M. TOWNSEND, New York: You have heard a very complete exposé of focal infections from the standpoint of the clinician, yet the method and manner of their relief is not clear. We believe that in presenting to you this new chemico-biologic method of attack we will be better able to control some of the systemic manifestations of these focal infections than we have hitherto. Despite a high degree of skill, surgical attacks frequently miss the point. This is the first step in the attack of focal infections based upon biologic medicine, and doubtless further investigation and study will develop better medicaments for use along the same lines. We believe that in presenting you with another weapon in the attack upon the toxins present in the circulatory system giving rise to clinical manifestations which we term toxæmias from focal infections, that we have at least made a step in advance.

LAVAGE OF THE RENAL PELVIS AND ALLIED THERAPEUTIC PROCEDURES IN THE TREATMENT OF PYOGENIC INFECTIONS OF THE KIDNEY.

IRVING SIMONS,
NASHVILLE, TENN.

I. History of Lavage of the Renal Pelvis.

Two years after the appearance of Pawlik's [94] communication on the possibility of catheterization of the ureters, Bozemann [11] of New York in 1888 conceived the idea of washing the renal pelvis. It is true that he did not carry out the procedure through natural channels, as his first case had a fistula which involved the female urethra and gave access to the ureteric orifices, and in his second and subsequent cases he made a vesico-vaginal incision in order to give access to them. Such a procedure naturally fell into desuetude.

To Kelly [70] is due the credit of the first case of therapeutic renal lavage, and in this case he washed the pelvis no less than one hundred and twenty times. In spite of the laboriousness of such an outlook, the procedure was taken up by others, and its establishment upon a firm basis merely awaited the development of the prism-cystoscope of Nitze, which was suitably modified by Caper [18] and Albarran,[1] who reported the first cases of pelvic lavage in males.

Since then reports followed in rapid succession from Stockmann,[114] Illyes, 1900–1905,[61] and Alex-

androff,[5] and of especial interest were the independent reports of von Frisch,[36] and Barth [36] before the second German Urological Congress in 1909.

In the United States, Gross [46] of San Francisco in 1903 was the next after Kelly to report, and he was followed in rapid succession by Ayres,[8] Johnson [64] of Boston, Bremmermann,[13] and Garceau.[40]

In France, Albarran reported observations on pelvic lavage before the Urological Congress in 1898, and at the same meeting Reynes reported the use of the ureteric retention catheter for the first time. Reports of Rafin,[101] 1904, Imber,[62] 1905, Andre,[6] and Souffrain,[107] 1906, established the procedures upon a firm basis in France.

From this time on, the literature up to 1911 is that of sporadic case reports with the exception of three masterly French graduation theses, that of Souffrain of Nancy, 1907, that of Penel [95] of Lyons, and of most importance that of Perineau [96] of Paris 1911. In addition to reporting a number of original observations, they collected all the cases that could be found in the literature, abstracted each one and incorporated them in their reports.

In the following presentation it seemed best to take up the work where Perineau left off, and to collect and analyze the reports of the years 1911–1916 inclusive. However, all the literature was studied and incorporated in the Bibliography.

II. The rationale of the therapy and the pathological conditions of the kidney, pyelon, and ureter that would theoretically be amenable to this treatment.

It is difficult to discuss the pathology of pyelitis, a condition which has been known to recover in a great many cases spontaneously or after the ingestion of urinary antiseptics. On the other hand, it is no doubt true that many of the cases that do not

recover in this manner go on to a more advanced stage of morbid change (usually pyonephrosis), and after nephrectomy the offending organ gives no idea of the pathology of the condition in which we are at present interested. At any rate it is sufficient to say that pyelitis is the condition, which is theoretically and practically most amenable to the form of treatment under discussion. Here we have the signs of acute inflammation of a mucous membrane: congestion and exudation with resultant pyuria and at times hæmaturia, and œdema with resultant internal narrowing of the ureteric tube, especially at its anatomically narrow points,* and a consequent pelvic retention and dilatation of greater or less degree (usually under 50 c.c.).

From a survey of the literature and in the light of certain personal experiences, it seems fairly certain that the mere passage of the ureteral catheter has been often sufficient to cause a sudden amelioration, within 12 to 24 hours, of the constitutional symptoms and if not a cessation, at least a diminution of the pyuria. This assertion is made on the basis of the record of a number of cures after one instrumentation accompanied by one pelvic lavage with any one of a dozen antiseptics, of a small personal experience, and on finding many reported cases that recovered quickly after diagnostic ureteral catheterization, whereas their authors attached no significance to the relation between the procedure and the result.

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*At this point it is in order to insist that a stricture is a permanent pathological entity, and when not congenital, consists in the narrowing of the lumen of a tube by scar tissue in its wall. The obstruction due to such a condition is not cured by a simple dilatation, recurs without subsequent treatment, and should be sharply differentiated from obstructive conditions due to swelling of the mucous membrane lining the tube. It is fair to insist on this, inasmuch as certain observers have reported these latter conditions as strictures and consequently have given the impression that stricture of the ureter is a much commoner condition than is probably the case.

III. The technique of pelvic lavage.

In performing lavage of the renal pelvis it is best to use a small catheter (preferably a No. 5 and certainly not larger than a No. 6) and to pass it if possible all the way into the renal pelvis. I prefer to pass the catheter all the way, as I believe that I have noticed that the pain in pyelography is usually exaggerated, if the eye of the catheter is in the lower ureter. Another advantage is that the reflux into the bladder is not interfered with. I employ preferably a 20 c.c. syringe with a blunted needle and irrigate the pelvis very gently, usually with 5–10 c.c. of solution at a time, allowing it to return before repeating the irrigation.

The solutions used by various authors are: Boric acid 2–4%, mercury oxycyanate 1–5000, argyrol 5–25%, protargol 1%, aluminium acetate solution, perhydrol (Merck), collargol 5–15%, and silver nitrate 1–1000 up to as high as 1–5%. It is an interesting thing to note that practically all observers obtain good results no matter what they use, so that it would seem that it really makes very little difference. Personally I have preferred the stronger solutions of silver nitrate, usually 1%, but I have increased this as high as 2½%. In using these strong solutions it is well to wait for the return of about as much as is instilled, or of a little more, in order to take account of the added urine excreted in this time, and to use saline in the bladder, as the sensation of the bladder to strong silver solutions is very much more acute than that of the pelvis and ureter. As a rule, the instillation of such strong silver solutions gives some soreness in the back (about as much as one ordinarily observes after collargol pyelography) but the efficacy of such solutions is not to be denied. It is well, however, not to instill a great amount of strong silver nitrate into hydronephrotic sacs or pelves in which there is doubt that it can be quickly recovered.

IV. Indications for the three procedures.

While it is true that a certain number of pyelitides recover with expectant treatment, it is also true that in pyelitis we have an inflammatory condition that is so contiguous to the essential parenchyma of the kidney that some claim that we are always dealing with pyelonephritides, *i.e.*, that in all pyelitis there is more or less associated infection of renal tissue. It is not within the scope of this paper to enter upon the routes of infection of the kidney, of which there are now four pretty well established, or to decide which particular type of infected kidney is due to which particular route or mechanism of infection. Suffice it to say that, in my opinion, it is not rational to assume that very many types of renal infection are amenable to this local method of therapy.*

A. Rationally considered as a curative measure, it would seem that pelvic lavage is indicated in the following conditions:

1. In acute pyelitis: In this form it is striking how efficacious the procedure is. It is of course impossible to say how much involvement of the renal parenchyma occurs in a given case, but certainly a certain number seem to recover without perceptible renal damage, when catheterization (usually with

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* It has been asserted that good results have been obtained with pelvic lavage in cases of nephritis (Bright's disease). If so, it is illogical to assume, in the light of our present knowledge, that these results were anything more than accidental, since, even if this is an infectious disease, the pelvic mucous membrane has certainly given no evidence of its involvement (hence the lack of rationale in lavage), and the ureter has given no evidence of obstruction (hence the lack of rationale in catheterization).

It should be kept in mind that renal tenderness and fever, especially with acute exacerbations of nephritis, is not as rare as some of the older writers would have one believe. (v. Addenda for case of nephritis with fever simulating pyelitis in which there was rapid amelioration of the symptoms after ureteral catheterization. Such a case if insufficiently studied, could easily be considered one of mild pyelitis cured by a single catheterization of the ureters.) It is on account of this, that in going over the literature for the construction of the tables that follow, many cases have been omitted, chiefly because of the lack of bacteriological reports.

lavage) is done, and this is no doubt due more to the re-establishment of drainage than to the sterilization of the infected mucous membrane. There is an idea current that catheterization of an acutely inflamed ureter and pelvis is dangerous, but I have not been able to convince myself that if it is properly done, it is associated with any but good effect.

From a diagnostic standpoint, it is of course important to separate the cases of multiple septic infarcts, but this can be done as a rule by one experienced clinically. In passing it might be said that these cases are by far more desperately ill than those of pyelitis and are not as a rule so commonly associated with repeated chills. Again, it is often striking how comfortable cases of acute pyelitis are between the chills. Again, the pus-content of the urine obtained from the affected kidney is as a rule greater in cases of pyelitis.

2. In chronic pyelitis: Pelvic lavage is particularly effective in chronic cases not associated with distension of the pelvis. When the distension has advanced to such a degree that the smooth muscle is more or less paretic, the prognosis is of course not so good. The same may be said of the prognosis based on the history of a long duration of infection and pyuria.

Chronic bacteriurias are at times puzzling as to etiology. Certainly some at least are due to mild chronic infections of the renal pelvis, or of a calyx, to which the local immunity is so great that very little cellular exudation and consequently little pyuria occurs. At any rate, it is an established fact that after one or more pelvic lavages the urine may become pus-free but contain viable bacteria. That this condition of bacteriuria is not to be regarded as unimportant is shown by the fact that such cases frequently relapse into pyuria and often into pyelitis and consequently a sterile urine as well as a urine free of pus cells is the therapeutic desideratum.

Finally it should be stressed that one should not become so enthusiastic about a procedure that acts as promptly as pelvic lavage does when indicated, as to exhibit it in cases where it can not possibly be of service, remembering that it is hardly of curative value where the inflammation of the kidney has advanced as far as even early destruction of the renal parenchyma.

B. As an adjuvant procedure and of secondary value, pelvic lavage is of service in mildly infected hydronephrosis, especially where a plastic operation on the sac is contemplated. The same may be said in the case of stones in the renal pelvis with mild infection, where pyelotomy is contemplated. In these two instances the sterilization of the pelvic mucous membrane is of value preparatory to operation.

C. The retention ureteral catheter: Its rôle is very limited. It is advocated and used by some in cases where there are apparently tight places in the ureter, notably situated just at the brim of the bony pelvis. It is also used in cases where lavage does not seem to produce good results, probably due to lack of drainage on account of turgescence of the mucous membrane. It has also been used where the pus in the pelvis is rather thick and does not easily run through the catheter; here, of course, repeated gentle lavages every six to twelve hours are indicated. It is also recommended in markedly neurasthenic subjects and in other cases where repeated cystoscopy is difficult, as in extremely irritable bladders.

Usually it is left in over night, allowing two lavages for each cystoscopy, but some observers have left them in place for weeks without apparent harm. Personally I have never left a ureteral catheter in place for six to twelve hours without such marked complaint that I was forced to remove it, and I think that while the procedure should not be condemned, it should be employed as little as possible.

V. Contraindications to pelvic lavage.

As we have eliminated from this category, acute pyelitic conditions which have been regarded by some as a contraindication, the matter resolves itself into a question of diagnosis.

It is of course important that acute septic infarcts be not mistaken for pyelitis, but even so, if the patient's condition is not perilous, it is possible that, as the diagnostic limen between these two conditions is very narrow, one may do well to err or tarry on the side of conservatism, as there is reason to believe that some cases of unilateral septic infarct may recover without nephrectomy.* In such a case, should the condition of the patient become progressively worse, suspicion should be aroused that lavage is not really contraindicated but simply not indicated.

Of course it is quite evident that lavage should not be used in renal tuberculosis, as much valuable time would be lost thereby and damage done at the same time. Again, calculous pyelitis is a contra-indication to lavage, unless it is used as an adjuvant to pyelotomy. Hydronephrosis would theoretically be a contra indication for lavage, although a number of observers, chiefly Frenchmen, have noticed marked contraction of hydronephrotic sacs after these treatments. According to these workers, the improvement (*i.e.*, the diminution in the amount of residual urine) is more marked in those cases where the pelvic distension is of so slight a degree or of so recent duration, that the smooth muscle fibre has not become too paretic to allow recovery of muscular tone. In these cases the stronger antiseptics such as silver nitrate (which as we know is also an astringent) are of most service. When the hydronephrosis is beyond the

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* Cunningham, J. H.: Acute unilateral hæmatogenous infections of the kidney. Sect. of G. U. Diseases. A. M. A., 1914.

early stage,* *e.g.*, when tumor formation is present, which would mean that the sac holds several ounces, very little can be hoped for in the way of diminishing the size of the sac by astringents.

Pyonephrosis is theoretically a contra indication to pelvic lavage. It is true that some results have been obtained, chiefly of a palliative nature, in large pyonephrotic sacs, and in these cases the retention ureteral catheter has been used to the greatest extent. However, the best that can be said for the procedure in these cases, is that it is palliative and is probably chiefly indicated where there is bilateral infection with considerable destruction of renal tissue on both sides. Here it is worth trying and might allow one to seize an opportunity for operative procedure on one or both sides.

VI. Tabulation of cases from the literature from 1911 to 1917.

As has been explained before, the literature up to 1911 has been thoroughly covered in the three French theses, of which the most complete is that of Perineau. These authors have collected and abstracted all the reported cases in which pelvic lavage, etc., was performed.

In the following tables the literature from 1911 to 1916 inclusive has been covered, but an attempt has been made to select the cases, the reports of which show that their authors have studied them in such a manner that they can easily be made to conform to the criteria which are represented in the heading of the tables. In these criteria, particular stress is laid on the report of the bacteriology, on the clinical result attained, on the number of lavages necessary to produce sterile urine, and on the duration that

* Cabot, Hugh: The diagnosis and indications for operation in early hydronephrosis. Reports of the G. U. Section of A. M. A., 1912.

such a condition has been followed (control examination). Other points of importance are also noted.

By such a selection of cases, we do not mean that reports of cases that do not measure up to these criteria are valueless, but merely that an attempt has been made to become informed through a study of the more recent literature, upon the finer points in the therapy, upon the underlying reasons for the successful results, and the goal to be striven for in order to attain them.

The first series of tables I to XI shows the results attained by lavage of the renal pelvis in acute and chronic pyelitis. In practically none of these sixty-four cases was anything else than lavage done.

A consideration of these tables shows among other things the following points of interest:

The 64 cases represent pyelitis, both acute and chronic, unilateral and bilateral, with or without distension. Among the 64 cases were 18 whose pelvis or pelves showed distension. Among these 18 cases, 15 showed a pelvic retention of 15 to 60 c.c., and could easily fall in the class of slight hydronephroses; in all but one of these cases cures were obtained, but no mention is made of the size of the pelvis after cure. Three cases showed retention of 100 to 110 c.c., and these were all cured by lavage, but in one of these mention is made of the fact that the distension was not relieved.

The bacteriology of the 64 cases shows 33 pure b. coli infections. The list is as follows:

B. coli	33
Gonococcus	5
Mixed infection	8
Staphylococcus	1
B. lactis ærogenes	1
B. paratyphosus	1
Pneumococcus	1
Staphylococcus albus	1
Bacilli	1
Sterile	2
Bacteriology not mentioned	10
	64

TABLE I.—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE.

Author	Pilcher I	Pilcher II	Pilcher III	Pilcher IV	Walsh I	Walsh II
Type	Chr. R.	Ac. Bilat.	Chr. L.	Ac. L.	Chr. R.	Chr. Bilat.
Urine						
Character	Cloudy				Cloudy	
Retention	30 c.c.					
Microscopic	Pus cells		Pus cells	Pus cells		
Bacteria	B. Coli		Sterile	Sterile	Gonococci	Staph. and diplococci
First Lavage	Argyrol 20%	Argyrol 25%	Argyrol 25%	Argyrol	Argyrol 8%	Argyrol
Result of 1st Lavage		Unfavorable	Pyuria improved	Temperature normal in 3 days		
Relapses						In Rt. K. 3 weeks after urine was normal
Subsequent Lavages	Another 7 days later with 40% Argyrol		One more with Argyrol			At 3-10 day intervals for 3 mos. with Argyrol up to 15%
Control Examination						
Result	Cured		Cured	Cured	Cured	Cured
Remarks	Normal labor 3 weeks later	Forced to empty the uterus 7 days after lavage. Recovery	6½ mos. pregnant Discharged cured one week after second lavage	Out of bed on 6th day	Urine normal in 3 months	Urine first normal after 3 weeks treatment. Then relapsed and cured by 6 lavages

TABLE II—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Cifuentes I	Cifuentes II	Cifuentes III	Santini	Wiener	Lehr
Type	Chr. Bilat.	Chr. L.	Chr. Bilat.	Ac. L.	Ac. L.	Chr. L.
Urine						
Character	Cloudy	Cloudy	Cloudy	Cloudy		
Retention	RK 22 c.c.			50 c.c.	30 c.c.	
Microscopic	Pus cells	Pus cells	Pus cells	Pus cells		
Bacteria			B. Coli	B. Coli		Gonococci
First Lavage	Arg. Nitr. 1/1000	Arg. Nitr. 1/1000	Arg. Nitr. 1/1000	$KMNO_4$ 1/5000	Arg. Nitr. 1/500	Argyrol 10%
Result of 1st Lavage	Markedly relieved			Markedly relieved for 2 days		No relief even after 2d lavage with Argyrol 30%
Relapses		In 2 months	In 4 months	2 days after 1st lavage.	1 week after 2d lavage	
Subsequent Lavages	Every 3 days for 8 times	10 times in 3 weeks	3 times on each side alternately in 2 months	1 more with Arg. Nitr. 1/1000	2 more	5 lavages with Arg.Nitr.1/3000 (average).
Control Examination						Sterile urine 2 weeks later
Result	Cured	Cured	Cured	Cured	Cured	Cured
Remarks		Relapse cured by subsequent lavages	Relapse cured by subsequent lavages	Cured by 1 lavage with Arg. Nitr. and retention catheter	Relapse cured by third lavage	

TABLE III—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Hunner I	Hunner II	Hunner III	Hunner X	Hunner XXI	Hunner XXIII
Type	Chr. R.	Chr. Bilat.	Chr. L.	Chr. L.	Chr. R.	Chr. L.
Urine						
Character	Cloudy				Creamy	
Retention						
Microscopic						
Bacteria	B. Coli		B. Coli	B. Coli		B. Coli
First Lavage	Arg. Nitr. 1/1000	Arg. Nitr. 1/3000	Arg. Nitr. 1/3000	Arg. Nitr. 1/1000	Arg. Nitr. 1/3000	Arg. Nitr. 1/3000
Result of 1st Lavage					Fever fell next day	
Relapses						
Subsequent Lavages	2 more	5 more	4 more at 6-day intervals	2 more	1 more 3 days later	2 more at weekly intervals
Control Examination	Urine sterile		Urine sterile 1 month later	Urine sterile		Urine sterile 1 month later
Result	Cured	Cured	Cured	Cured	Died	Cured
Remarks	2 more lavages after urine was sterile	Relapse in Rt. K. 1 year later cured with Arg. Nitr. 1/1000	Rt. Pyelitis 6 months later cured by 6 lavages		Mitral stenosis and 5 months pregnant. Died 2 weeks later	Urine sterile after 2d lavage

TABLE IV—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Hunner XXV	Stossmann I	Stossmann VI	Geyerman VIII	Gaigl IX	Cuturi I
Type	Chr. R.	Chr. L.	Chr. L.	Chr. Bilat.	Chr. Bilat.	Chr. L.
Urine						
Character			Cloudy			
Retention						
Microscopic	Pus cells		Pus and blood cells		Pus cells	Pus and blood cells
Bacteria	B. Coli			Gonococci	B. Coli	Streptococci and Bilharzia
First Lavage	Arg. Nitr. 1/1000	Arg. Nitr. 1/1000	Protargol 15%	Silver solution	Collargol 5%	Arg. Nitr. 1%
Result of 1st Lavage						
Relapses			2 relapses			
Subsequent Lavages	7 more at 5-day intervals	Another 4 days later	1 every 2 days beginning 5 days later		Twice a week for 2½ weeks	10 lavages in a month increasing to Arg. Nitr. 3%
Control Examination	Urine sterile 2 months later					
Result	Cured	Cured	Cured	Cured	Not cured	Improved
Remarks	Urine sterilized on 11th day	Well in 1 week	Well on 18th day	Ureteral catheter left in 5 days	Pus cells and B. Coli present on discharge	Hæmaturia and pain relieved

TABLE V—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Cuturi II	Cuturi III	Voron	Spengler III	Spengler IX	Albrecht III
Type	Ac. R.	Ac. Bilat.	Ac. L.	Chr. R.	Ac. Bilat.	Ac. R.
Urine						
Character				Cloudy	Cloudy	Cloudy
Retention	40 cc.			20–25 c.c.	RK 25 c.c. LK 30 c.c.	15 c.c.
Microscopic	Pus cells		Pus cells	Pus cells	Pus cells	Pus cells
Bacteria	Gonococci	B. Coli	B. Coli	B. Coli	B. Coli	B. Coli
First Lavage	Arg. Nitr. 2%	Arg. Nitr. 1%	Collargol	Arg. Nitr. 1/500	Arg. Nitr. 1/000 alternately	Arg. Nitr.
Result of 1st Lavage		Relieved for 15 days	Immediate relief of symptoms	All right 2 days later	No improvement	
Relapses		Relapse in 15 days				
Subsequent Lavages	7 more necessary in 2 weeks				4 more	Repeated lavages necessary
Control Examination				Urine sterile 9 days later		Urine normal 4 weeks after
Result	Cured	Cured	Cured	Cured	Not improved	Cured
Remarks		Labor 6 weeks later. 5 lavages needed to clear urine			Abortion necessary and cleared urine in 2½ weeks	

TABLE VI—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued*

Author	Ruebsamen I	Ruebsamen II	Ruebsamen III	Le Fur III	Le Fur VI	Brongersma I
Type	Chr. R.	Ac. R.	Ac. L.	Chr. R.	Chr. R.	Chr. R.
Urine						
Character		Cloudy	Cloudy		Cloudy	
Retention	20 c.c.	40 c.c.	110 c.c.	45 c.c.	60 c.c.	30 c.c.
Microscopic				Pus cells		Pus and blood cells
Bacteria	B. Coli	B. Coli and diplococci	B. Coli	B. Coli		B. Coli
First Lavage	Protargol 5%	Protargol 5%	Protargol 5%	Arg. Nitr. 3%	Arg. Nitr. 2%	Arg. Nitr. 1%
Result of 1st Lavage	Rt. urine sterile 4 days later	Cured 8 days later	Retention and symptoms relieved 4 days later			
Relapses						
Subsequent Lavages			1 more with Arg. Nitr. 1/500 because of presence of B. Coli.		1 more Arg. Nitr. 2% Retention catheter 24 hours	
Control Examination			LK. sterile 3 days after 2d lavage. Bladder sterile 2 weeks later			
Result	Cured	Cured	Cured	Cured	Cured	Cured
Remarks	8 months pregnant	8 months pregnant	Post-partum	8 months pregnant	5 months pregnant	4 months pregnant

TABLE VII—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Hohlweg I	Hohlweg II	Hohlweg III	Hohlweg IV	Hohlweg V	Hohlweg VI
Type	Chr. R.	Ac. L.	Chr. L.	Chr. L.	Chr. Bilat.	Chr. L.
Urine						
Character						
Retention				100 c.c.		
Microscopic		Pus cells	Pus cells	Pus cells	Pus cells	
Bacteria	B. Coli	B. Coli	B. Coli	Staphylococcus	B. Coli	B. Lactis Aerogenes
First Lavage	Arg. Nitr. 1/200	Arg. Nitr. 1/200	Arg. Nitr. 1/1000	Arg. Nitr.	Arg. Nitr. 1/200	Arg. Nitr. 1/200
Result of 1st Lavage						
Relapses					7 months later	
Subsequent Lavages	2 a week for 2 weeks	1 more	3 more up to 1/200	3 more	3 more	1 more
Control Examination	Sterile urine 18 months later	Sterile urine 2½ years later	Sterile urine 1 year later	Sterile urine 2 years later	Sterile urine 14 months after relapse	Sterile urine 18 months later
Result	Cured	Cured	Cured	Cured	Cured	Cured
Remarks				Of 7 years' duration	Relapse on right side 7 months later cured by 2 lavages	

TABLE VIII—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Hohlweg VII	Hohlweg VIII	Hohlweg IX	Hohlweg X	Hohlweg XI	Hohlweg XIII
Type	Chr. L.	Chr. R.	Chr. Bilat.	Ac. R.	Ac. R.	Chr. R.
Urine						
Character						Cloudy
Retention						
Microscopic	Pus cells	Pus Cells	Pus cells	Pus cells	Pus cells	Pus cells
Bacteria	B. Coli	B. Coli	B. Coli	B. Coli	B. Coli	B. Paratyphosus
First Lavage	Arg. Nitr.	Arg. Nitr.	Arg. Nitr. 1/200	Arg. Nitr. 1/4000	Arg. Nitr. 5%	Arg. Nitr. 1% and Perhydrol ¾%
Result of 1st Lavage	Urine sterile 15 days after					
Relapses						5 months later
Subsequent Lavages	1 more	2 more	12 more		1 more with 5% and 1 with 1/500	9 more with Arg. Nitr. and Perhydrol
Control Examination	Sterile urine 12 months later	Sterile urine 4 months later		Sterile urine 12 months later	Sterile urine 10 months later	Clinical cure of relapse but bacteriuria. persisted
Result	Cured	Cured	Cured	Cured	Cured	Improved
Remarks			Rt. Kidney sterilized by 7 lavages Lt. K. by 6			

TABLE IX—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Hohlweg XIV	Hohlweg XV	Hohlweg XVII	DeGottal I	DeGottal II	Violet
Type	Chr. R.	Chr. R.	Ac. R.	Chr. R.	Ac. R.	Chr. R.
Urine						
Character			Cloudy	Cloudy	Cloudy	
Retention				25 c.c.		100 c.c.
Microscopic	Pus cells	Pus cells	Pus cells	Pus cells	Pus cells	
Bacteria	B. Coli	B. Coli	B. Coli	Mixed infection		Pneumococcus
First Lavage	Arg. Nitr. 1/400 and Argyrol 5%	Arg. Nitr. 1/1000 and Argyrol 5%	Arg. Nitr. 1/500	Arg. Nitr.	Arg. Nitr. 1/1000	Arg. Nitr.
Result of 1st Lavage						
Relapses						
Subsequent Lavages	3 more up to 1/150	1 more	1 more	7 more in 3½ weeks	9 more at 3–10 day intervals increasing silver to 2%	2 more with 1/500 to 1/200
Control Examination	Sterile urine 3 months later	Sterile urine 4 months later	Sterile urine 6 weeks later	Normal urine 1 month later	Normal urine 3 months later.	
Result	Cured	Cured	Cured	Cured	Cured	Cured
Remarks	Urine sterilized in 22 days	Urine sterilized in 10 days		Catheter left in over night each time	Catheter left in over night each time	Pyuria relieved. Distension not diminished

TABLE X—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Geraghty I	Geraghty II	Geraghty III	Geraghty IV	Walther I
Type	Ac. R.	Chr. Bilat.	Chr. Bilat.	Chr. I.	Ac. Bilat.
Urine					
Character	Cloudy		Rt. — Cloudy Lt. — Clear	Cloudy	
Retention					Rt. — 5 c.c. Lt. — 15 c.c.
Microscopic	Pus cells	Pus cells		Pus cells	Pus cells
Bacteria	B. Coli	B. Coli and Staph. Albus	Rt. — Bacilli and cocci Lt. — Cocci	Staph. Albus	B. Coli
First Lavage	Arg. Nitr. 1/200	Arg. Nitr. 1/200	Formaldehyde 1/4000	Formaldehyde 1/4000	Arg. Nitr. 1/500
Result of 1st Lavage	Improvement	No result	No result	No result	Temperature etc. fell in a few hours
Relapses					Relapse 4 days later. Another 2 weeks later.
Subsequent Lavages	1 more 4 days later	2 more with Arg. Nitr. 2% and 1 more with 5%	Arg. Nitr. 1/200–1/50 with no result but cured by 3%	No result with this and silver 1%. Cured by 5%	
Control Examination		Sterile 3 days after last lavage	Sterile 1 month after	Sterile 6 months after	
Result	Cured	Cured	Cured	Cured	Cured
Remarks		Staph. were dislodged by 2% but 5% needed for cure			1/200 controlled first relapse. 2% necessary for 2d relapse

TABLE XI—ANALYSIS OF 64 CASES OF PYELITIS TREATED BY PELVIC LAVAGE—*continued.*

Author	Aynesworth II	Aynesworth IV	Aynesworth V	Hoover I	Hoover II
Type	Ac. R.	Ac. R.	Ac. Bilat.	Chr. Bilat.	Chr. R.
Urine					
Character	Purulent	Cloudy	Rt. — Cloudy Lt. — Clear		
Retention					
Microscopic		Pus cells	Pus cells	Pus cells	Pus cells
Bacteria	Bacilli	B. Coli and Staph.	B. Coli	Gonococci and B. Coli	Gonococci
First Lavage	Water	Argyrol 10%	Argyrol 10%	Argyrol 5%	Argyrol 5%
Result of 1st Lavage	Immediate relief	Immediate fall of temperature	Temperature normal on 4th day		
Relapses		2 months later			
Subsequent Lavages		2d lavage 5 days later		5 more	3 more
Control Examination	Cured several months later			Urine sterile 2 weeks later	Urine sterile 3 weeks later
Result	Cured	Cured	Cured	Cured	Cured
Remarks		Relapse cured by 2 lavages		Lt. Kidney sterilized after 3d lavage	Rt. Kidney sterilize after 3d lavage

It is of interest that cure is obtained without regard to the type of bacteria with which the kidney is infected and relapse or permanent failure is due to other causes. However, it is singular that the only paratyphosus cases was among the failures.

The antiseptics used in lavaging the 64 cases were as follows:

Silver nitrate 1/4000 to 1/200	25
Silver nitrate 1 to 5%	7
Argyrol 5–40%	11
Potassium permanganate 1/4000	1
Silver solution	6
Protargol 5–15%	4
Collargol 5%	2
Water	1
Several solutions	7
	64

As a rule most workers preferred lavages with weak silver nitrate solutions rather than instillations with the stronger, although those who used the stronger solutions claim that their success was due only to them, they having tried the weaker in most of the cases before resorting to the stronger. However, it is possible that a few more lavages with the weaker solutions might have given the same desired results. It is of interest that practically all solutions are successful and failure seems to be due to other causes.

The number of lavages required is of utmost importance to the urologist, as it enables him to estimate the time to be consumed for cure, meaning, of course, for the most part bacteriological cure.

Of 64 cases, 11 were cured by one lavage, 13 were cured by two lavages, 40 were cured only after three or more lavages. This means that a little more than one third of the cases require not more than three cystoscopies to produce and prove sterility of the pelvic urine. In proving a cure it is important to get the control urine by ureteral catheter, as the

bladder may remain infected and even obstinately so for some time after the kidney has been sterilized. In very few cases was it necessary to lavage the pelvis more than half a dozen times.

Cure was obtained in 58 of the 64 cases and the procedure failed in 6 cases. This high percentage of cures is due to the fact that most of the cases in which the procedure failed came to operation, inasmuch as the procedure was not indicated in those cases. In other words 90% represents the success that should be attained in cases in which lavage should be done. This point is elaborated upon in another section.

Table XII shows the result in 19 cases in which lavage was done by Hartmann. Although these cases could not be analyzed according to our tabulated criteria, they were included because of the large amount of work done by the author. They agree practically with the above results.

Ureteral Catheterization as a therapeutic measure. As has been brought out in a previous section, there is no doubt that some of the benefits that result from lavage of the renal pelvis ensue on the relief of the retained urine, which is in a state of stasis in the pelvis. This relief is in all probability due to the opening up of the ureteric channel, which is blocked by purulent secretion or an œdematous condition of the ureter. This same condition of relief occurs at times spontaneously, with a gush of pus into the bladder, the urine of which had been previously negative for pus cells, and with this appearance of pus cells the general symptoms abate, at least for a time. The entire rationale of therapeutic ureteral catheterization is based upon this theory and upon the fact that practice bears it out.

For some peculiar reason the cases in the literature between 1911 and 1917 in which mere ureteral

catheterization has been of curative value have all been those of pyelitis of pregnancy or the puerperium. They number in all 11 ante-partum and 5 post-partum cases. In practically all these cases there was a rapid fall of the temperature within a dozen hours after mere catheterization of the ureter or ureters. In 12 cases one catheterization was sufficient; in 4 cases two were necessary. In 10 ante-partum cases out of 11, the patients went on to term, whereas there was strong probability that they would have aborted without the procedure. In only one case was the uterus emptied, and then by vaginal Cæsarean section.

In a few cases, not included in this series, it was necessary, on account of the failure of several ureteral catheterizations, to resort to lavage, or retention catheter, or both. In some cases clinical relief was obtained and after the gestation the urine was rendered sterile by lavage.

It is difficult to explain exactly how a single catheterization can give such relief, but the clinical result is very plain to those who have observed it. Any objection to lavage as possibly giving insult to a damaged kidney is waived in this instance.

The chief exponent of this measure is Mansfeld, who in his series of pyelitides of pregnancy, reports ten cases treated in this manner, and all with excellent results. The obstruction in these cases is thought by some to be due to the pregnant uterus, but this explanation is looked upon with skepticism by others. Many report difficulty in passing the catheter at a point 10 to 15 cm. from the ureteric mouth. Mansfeld says: "When one has catheterized many ureters in pregnancy, one comes to the conclusion that it is certainly not the pregnant uterus that acts as a mechanical hindrance." It must again be insisted upon that these conditions are not strictures.

TABLE XII—TABLE FROM HARTMANN OF CASES TREATED BY PELVIC LAVAGE.

Case No.	Clinical Diagnosis	Bacteriology	Result: Bacteriological	Clinical
1.	Pyelitis Duplex	B. Coli	Sterile	Cured
2.	Pyelitis Duplex	B. Coli	Sterile	Cured
5.	Pyelitis Left	Staphylococcus	Sterile	Improved
7.	Pyelitis Duplex	B. Coli	Sterile	Cured
8.	Pyelitis Dextra	?	Sterile	Cured
11.	Pyelitis Dextra	Staphylococcus	Sterile	Cured
13.	Pyelitis Dextra	B. Coli	Not sterile	Improved
	Pyelitis Sinistra	B. Coli	Sterile	Cured
14.	Pyelitis Dextra	B. Coli	Sterile	Cured
17.	Pyelitis Dextra	B. Coli	Sterile	Cured
16.	Pyelitis Duplex	B. Coli	Lt. untreated	
			Rt. sterile	Cured
18.	Pyelitis Dextra	Diplococci	Poor technique	Not cured
6.	Pyelitis Dextra, stones left	B. Coli		Not cured
24.	Pyelitis Dextra	?	Sterile	Cured
25.	Pyelitis Sinistra	B. Coli	Sterile	Cured
30.	Pyelitis Duplex	Refused		Pyonephrosis
31.	Pyelitis Dextra	B. Coli	Sterile	Cured
32.	Pyelitis Dextra	B. Coli	Refused on account of stones	
33.	Pyelitis Duplex	B. Coli	Treatment impossible	
15.	Pyonephrosis Dextra	B. Coli	Refused	

TABLE XIII—CASES IN WHICH THE RETENTION URETERAL CATHETER WAS USED.

Author		Reason for using	Type case	Duration of Catheterization		Result
				1st Time	Subsequent	
Stossmann	VII	Too bad for operation	Urethral polyp post-operative	5 days well borne		Failure
Mansfeld	V		Pregnant 5 months	Rt. 10 hours Lt. 48 hours		Forced to do abortion
Mansfeld	XVIII		Pyelitis Coli bilat.	Bilateral 10 hours		Clinically cured in 3 days
Gaigl	III	About to abort	Rt. Pyelitis			Aborted. Urine unimproved
Hartmann	XIII		Rt. Pyelitis	12 hours		Cured with assistance of lavage
Albrecht	I		Pyelitis Bilat. Coli.	1 hour	1 hour 5 more times	Some improvement but cured with lavage
LeFur	V	Retention 120 c.c.		48 hours		Cured where lavage failed
LeFur	VII	Very Chr. Case. Retention 60 c.c.				Did not cure or reduce retention
Brongersma	II	Failure of lavage		30 days		Failed. Abortion occurred and then urine cleared
Hohlweg	XVI	Failure of lavage to sterilize		24 hours	24 hours once more	Failed to sterilize urine
Squicciarini	II	Failure of lavages		5 days		Cured
Pilcher	VI	Retention 135 c.c.		5 hours		Cured but associated with Argyrol lavages

TABLE XIV—CASES OF HYDRONEPHROSIS.

Author		Type	Cause	Capacity	Treatment	Ultimate Reduction
Hunner	IV	Bilat.	Multiple strictures of ureter	Rt. 100 c.c. Lt. 120 c.c.	Arg. Nitr. 1/500 about 15 times	Rt. 60 c.c. Lt. 35 c.c.
Ruebsamen	III	Left	Post-partum	110 c.c.	Protargol 5% once	No stasis after one lavage
LeFur	IV	Left	Pregnancy	160 c.c.	Argyrol 5% once	2d test 40 c.c. 3d test 18-20 c.c.
Fritz	I	Left		500 c.c.	Lavage with Arg. Nitr. every 3d day	Returned to normal size

Whatever the explanation may be, the fact remains that the procedure is efficacious and that it is of most benefit or has been used with greatest effect in pyelitis of pregnancy. Its simplicity is another argument against therapeutic abortion, and the rapidity with which results are obtained render it justifiable in the most extreme cases, where oliguria or even anuria have occurred, as little time will be lost in case the procedure fails utterly.

The Retention Ureteral Catheter. In the minds of some it is questionable whether it is ever advisable to leave a ureteral catheter in situ longer than a couple of hours. Certainly most patients in this country do not tolerate the procedure as well as those which I have seen abroad. However, it can be said that in all probability the mucous membrane will not be damaged, as the woven catheter will become very soft in moisture at body heat.

In the small series of twelve cases (Table XIII) in which the procedure was used and well reported during 1911 to 1917, the following results were noted:

In six cases it was a completed failure and either had to be removed on account of pain, or abortion occurred, or because it did not aid in attaining a sterile urine. In three cases it attained a cure by being assisted with more or less pelvic lavage. In three cases it attained a cure where lavage had previously failed.

It should be remembered that much was demanded of it, because in all the cases in which it was used lavage had proven a failure, so that they were no doubt cases of very stubborn infection. There is no question but that there is a distinct indication for the use of the retention ureteral catheter, and this has been discussed in a previous section. Suffice it to say, however, that it should always be held in reserve in cases where the infection resists lavage for a reasonable length of time and especially where

this is associated with marked pelvic residual urine, and one is suspicious that the contour of the sac is attributing to the failure. Here pyelography should be brought into play and the use of the catheter be made dependent on the findings.

From the few cases here tabulated (Table XIV) it is plain that rather marked reductions in the capacity of the sacs has been observed. However, it may be said that in most of the cases where lavage was reported as done in cases where the pus was very thick, the case was soon suspected of being pyonephrosis and operation proved this.

VII. Prognosis.

In considering the post-mortem findings and the findings in the operating room, it is a striking thing that uncomplicated pyelitis has practically no mortality. This must mean that no matter how severe the febrile symptoms may at times be, fatal renal insufficiency rarely occurs. In some cases anuria (usually only oliguria) occurs, but this is as a rule of short duration. The hyperpyrexia seems to be well borne, probably because of the rapidly following remissions, and the continuous fever and typhoid state so common in multiple septic infarct is almost never encountered. If there is always a bacteriæmia, as has been demonstrated in some cases, the organisms are usually taken care of in the body or excreted, as metastases, especially in colihæmia, are practically unknown.

In spite of this picture of favorable prognosis in untreated uncomplicated acute pyelitis, it should be remembered that the same cannot be said of pyelitis accompanied by stones, nor can we say in any given case whether the renal parenchyma is already infiltrated with pyogenic bacteria, and if so, to what extent it is involved and to what stage these foci

have advanced, as there is a grave possibility of abscess formation, with subsequent pyonephrosis.

Again, in cases where there is obstruction, with pelvic retention, there is grave danger of infected hydronephrosis. And lastly and of most importance, it should be borne in mind that most cases of acute pyelitis result in chronic pyelitis, and in infections of all mucous membranes the longer the organisms are active, the more apt are they to produce deeply seated lesions, to intrench themselves, and on account of the difficulty in dislodging them, to result in repeated exacerbations, all of which lay the patient liable to the complications above mentioned.

On account of all these things, in discussing prognosis, one should consider the following:

The history of duration of the case is of utmost service. Given a case of apparently uncomplicated acute pyelitis, and the prognosis under lavage is good. It is immaterial if there is associated pregnancy, as one should expect to carry the pregnant woman on to term with pelvic lavage, and after labor the outlook for drainage is better. One should never consider abortion as a therapeutic measure except in the most extreme cases. The severity of the constitutional symptoms is no indication of bad prognosis, unless the patient is practically in the typhoid state.

The ureteral catheter at times offers data in establishing prognosis. If the catheter drains very little or there is thick purulent material in the renal pelvis, which does not wash out easily, the outlook is of course worse. Such a condition as the latter, would of course suggest the possibility of pyonephrosis. Again, if the urine obtained contains bacteria but very few pus cells and the symptoms are severe, the prognosis is not so good, as there is a possibility of septic infarction. The presence of pus cells and bacteria from both kidneys does not, strange to say,

seem to increase the gravity of the prognosis, although it may be said that it usually requires a greater number of lavages and consequently a more extended treatment.

Bacteriology seems to give little data in prognosis. Although the colon bacillus is the common finding, the other organisms, such as gonococcus, staphylococcus, streptococcus, bacillus mucosus capsulatus, pneumococcus, etc., seem to be dislodged about as easily. One case of paratyphosus infection (Hohlweg Case XIII) could not be permanently cured by lavage. Mixed infections, especially those with gram positive bacilli, seem to be very stubborn. The presence of staphylococci and streptococci should put one on his guard as to the possibility of cortical infection and consequently a graver prognosis.

Physical examination at times gives some data for prognosis. The presence of an easily palpable mass on the offending side should suggest the possibility of pyonephrosis. In going over the literature it is easy to see that most of the cases in which lavage failed, have come to operation revealing pyonephrosis possibility, with stones and like advanced lesions of the kidney, and hence the failure is not to be attributed to the lavage but to the faulty diagnosis and imperfect indication for the procedure.

In chronic cases, radiography should be used to eliminate calculi if possible, and associated with pyelography may reveal marked distortion of the renal pelvis and hence give a poor prognosis under lavage treatment or perhaps a contraindication to it.

Finally, it cannot be too strongly insisted that lavage of the renal pelvis has a very limited though very successful and important field, and that an accurate selection of cases should be made by accurate and thorough study. Lavage will thus be contraindicated in certain accurately studied cases, whereas

it would otherwise have been considered as having failed, if the cases had not been so studied.

VIII. What is a cure and what condition should we strive to attain?

These questions have been practically answered here and there in the preceding pages. Having realized that pyelitis is a condition of local infection of the pelvis of the kidney, more or less associated with inflammation of the parenchyma and with more or less pelvic retention due to inflammatory swelling of the ureteral mucosa or blocking by purulent secretion, we should strive to relieve the constitutional symptoms by relieving the obstruction, and we should furthermore strive to prevent the further infection of the renal parenchyma by sterilization of the urine. At times, if the first end is attained, the second follows automatically. Should it not, the procedure should be continued, whether it be lavage or some other, until the renal urine is absolutely free of pyogenic bacteria. The mere relief of the pyuria is absolutely insufficient as most of the cases in which the bacteria persist, even in the absence of pus cells, are doomed to relapse. It cannot be too strongly stressed that only a bacteriological cure is an adequate cure.

Remembering that most cases react to half a dozen lavages, one should begin to be suspicious, when this point is reached and the pyuria and bacteriaria is not improved, that the diagnosis of pyelitis may be at fault, inasmuch as practically all the failures laid at the door of pelvic lavage are to be attributed to faulty diagnosis.

IX. Addenda.

Case I. Mrs. W. T. G. (Referred by Dr. C. R. Sharp.) 8/3/15. Patient was delivered of a normal child six weeks before. Since then has been having

chills and fever, which at times reached 104° F. Bladder urine contains pus and b. coli.

Physical examination: Looks well, some tenderness in right loin. Temperature 102. Cystoscopy: Bladder normal. Catheters pass easily 25 cm. on both sides. Right ureter — no drainage. Left ureter — clear urine with a few epithelial cells and numerous hyalo-granular casts. Left side washed easily with argyrol 5%, but the fluid would not run through the right catheter and on removal the catheter was found to be blocked, it not having been tested out previously, as should have been done. It was not replaced, as the cystoscopy was done in bed and was difficult. Patient had no further chills or fever and was apparently well in a week.

Remarks: A case where mere ureteric catheterization sufficed.

Case II. Mrs. J. P. W. (Referred by Dr. S. M. Bloomstein.) Patient is five months pregnant, and has been having pain in the right loin, fever, and pyuria for a week and an occasional chill. Physical examination 3/1/16. Looks septic, temperature 104, pulse 120, has been having marked hæmaturia for the first time to-day. Slight tenderness in the right loin, no mass felt. Urine very bloody.

3/2/16. Cystoscopy: Bladder urine very bloody and washed clear with difficulty. Right ureteral orifice normal and catheterized easily. Left orifice normal in contour, but blood was ejected from it several times; the ureter was then catheterized.

Right urine:	Left side:
Flocculent sediment of pus and blood cells.	Anuria
Pus casts, blood casts, and granular casts.	
B. coli. Urea ..... 1.4 %	
Phenolsulphonephthalein intravenously:	
Appeared in 10 minutes.	
First 15 minutes 3.75%	
Second 15 minutes ..... 2.5 %	
90 minutes, bladder specimen ... 0.0 %	
2 hours 6.25%	

On account of the anuria and marked hæmaturia on the left side, which was negative clinically, it was thought inadvisable to lavage the right pelvis. The temperature fell to normal in two days and the patient was on the road to recovery in a week, the hæmaturia having gradually cleared, and the two-hour phthalein excretion was at this time 55.5%. Patient went to term and had a normal labor.

Remarks: A case where mere catheterization served the purpose.

Case III. Mrs. C. H. G. Aged 65. (Referred by Dr. Crittendon.) Present illness: 8/17/16, at 2 a.m. had a chill of fifteen minutes duration, and severe right iliac pain. The next day the temperature was 102, and there was a slightly moveable, tender mass in the right iliac fossa. The urine was normal; w. b. c. 20,000; polynuclears 96%. A possibility of an appendicular abscess was entertained until 8/19/16, when she had another chill, and the urine became cloudly with pus; the temperature then fell.

8/20/16. Cystoscopy: The right urine was cloudy with pus containing b. mucosus capsulatus, a 15-minute phthalein collection yielded 6%, and the right pelvis was lavaged with silver nitrate 0.5%. The left urine was negative, except that the phthalein did not appear in 36 minutes after intravenous injection, whereas it had begun to show on the right side in twenty-one minutes.

8/24/16. Cystoscopy: Right urine cleared a great deal, only a few pus cells, cultures sterile, right lavage with arg. nitr. 1%.

8/29/16. Cystoscopy: Right urine again sterile. Lavage with arg. nitr. 0.5%. Patient is well at present date, six months later.

Remarks: Kidney pelvis sterilized by one lavage with strong silver nitrate. B. mucosus capsulatus, a rare infection.

Case IV. J. I., male, 50 years old. Has had pyuria and frequency for some months. Has a scar of a suprapubic cystotomy but was unrelieved by the operation. Prostate not enlarged and kidneys not palpable. Radiographs negative. Urine contains pus and a few blood cells.

Cystoscopy: 10/19/14. Both ureteral orifices reddened and pouting. Right urine contains some pus and 14.5% phthalein in thirty minutes. Left urine contains a large amount of pus and 6% in same period. Both urines show streptococci and gram positive unidentified bacilli.

Diagnosis: Right, chronic pyelitis. Left, possible pyonephrosis, and hence operation was done on the left side.

10/20/14. Nephrotomy and drainage of left kidney. No pyonephrosis found. Thickened pelvic mucous membrane. Drainage was very foul and the nephrotomy was not entirely regreted.

11/10/14. Cystoscopy and lavage of both pelves with argyrol 5%. Right pelvis held 21 c.c.

11/17/14. Bilateral lavage with argyrol 5%.

11/23/14. Bilateral lavage with arg. nitr. 1/200.

12/1/15. Bilateral lavage with arg. nitr. 1%.

12/8/15. Patient went home temporarily, with urine much improved, to return later. Urines not yet sterilized.

1/29/15. Readmitted to hospital. Urine turbid and acid. Sediment of pus cells.

1/30/15. Cystoscopy: Right urine more cloudy than left. Bilateral lavage with arg. nitr. 1.5%.

2/3/15. Urine improved as to pus content but a few organisms still present. Improved physically and allowed to go home. Case not followed.

Remarks: Stubbornness of mixed infections. Greater improvement on the use of strong solutions of arg. nitr. when the others failed.

Case V. Mrs. A. L. (Referred by Dr. Crittendon.) Patient is a multipara about thirty-five years old and is not now pregnant. For the past week has been having fever, especially in the evenings, and some pain in the back, chiefly on the right side. Patient has had chilly feelings but no distinct chill. Urine has been high colored, and seems to have some sediment.

Diagnosis: Probably right-sided pyelitis.

Physical Examination: Patient somewhat obese. Some tenderness in both loins, chiefly on the right side. Kidneys not felt. Temperature 101⅘, pulse 100. Vaginal negative. Urine: bladder catheterized specimen, dark amber, cloudy, with flaky sediment composed of epithelium, white cells, and many coarsely granular casts. Urea 3.3%.

11/27/16. Cystoscopy: Bladder normal, both ureters easily catheterized.

	Right Urine.	Left Urine.
	Dark amber, cloudy. Epithelium and moderate number of white cells.	Dark amber, cloudy. Some epithelium and traumatic blood cells. Many coarsely granular casts.
	Urea 3%	Urea 2.8%
Phthalein intravenous:		
Appeared	9 minutes	12 minutes
1st 15 min.	3.75%	1.25%
2d 15 min.	10.	Trace
	13.75%	1.25%

Cultures of both sides on serum agar were negative.

Remarks: A case of nephritis with temperature that could easily have been considered a case of pyelitis if poorly studied, inasmuch as the temperature rose to 102⅘ on admission to the hospital and fell to normal and remained there within thirty-six hours after ureteral catheterization. Result, recovery.

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A CASE OF MEMBRANOUS CYSTITIS SHOWING PSEUDODIPHTHERIA BACILLI.

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Whether or not the organisms grouped under the general heading of "pseudodiphtheria" were only involution types of the bacillus of Loeffler, or whether they were a distinct entity, was long a subject of dispute. I think we may now safely assume bacteriologists to be agreed that there are a large class of organisms resembling the diphtheria bacillus in many respects but differing from it always in this essential, that they do not produce diphtheria toxin.

Of the pseudodiphtheria bacilli, those organisms which have been grouped under the name of "B. Hofmanni," and which are often difficult to separate from the bacillus of Loeffler by stains and cultures, have one persistent characteristic, namely, that they do not produce acid in the fermentation of glucose. The pseudodiphtheria organisms of the b. xerosis group are distinguished likewise by the fact that they ferment saccharose and not dextrin, the reverse being true of the diphtheria bacillus.

The pseudodiphtheria organisms are generally held to be non-pathogenic to animals, but "all the pseudo and the non-virulent morphologically typical varieties of the diphtheria organism, when inoculated into the peritoneum of guinea-pigs in immense doses, cause death." [1]

[1] Williams, *Jour. Med. Research*, June, 1902.

Generally classed as saphrophitic, the pseudodiphtheria bacillus was claimed by Spronck[2] to be the responsible factor in pathogenic conditions, and his experimental work has apparently been confirmed by Hamilton,[3] Pennington,[4] and many other investigators.

The presence of the pseudodiphtheria bacillus in the genito-urinary tract has long been recognized. Its possible importance in bladder disease was first brought to our attention by Rosenow,[5] who reported a case of membranous cystitis in which this bacillus was present "in predominating numbers" in the urine, together with b. coli.

The subject of pseudodiphtheria infections in its relationship to the genito-urinary tract was exhaustively studied by Townsend.[6] He reports a case of membranous cystitis showing a pure culture of the pseudodiphtheria bacillus, which was not pathogenic to guinea-pigs. A third case of membranous cystitis has been reported by Curtis,[7] likewise showing a pure culture of this organism.

My case of membranous cystitis showed on culture an organism identified as belonging to the b. xerosis group, together with the staphylococcus citreus.

It is interesting to note that in none of these four cases is there any previous history of genito-urinary disturbance or of any instrumentation of the urethra or bladder before the onset of the trouble. The only possible exception is Rosenow's case. His patient had had a double salpingo-oöphorectomy done six months previous for "intense nervousness, painful menstruation, and vaginal discharge."

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[2] Spronck, *Semaine méd.*, XVI, 317.
[3] Hamilton, *Jour. Infectious Dis.*, March 19, 1904, p. 690.
[4] Pennington, *Jour. Infectious Dis.*, Jan., 1907, IV, 49.
[5] Rosenow, *Jour. Inf. Dis.*, 1909, VI, 296.
[6] Townsend, *Jour. A. M. A.*, LXI, 1605.
[7] Curtis, *Jour. A. M. A.*, LXIV, 269.

Two of the four cases were adult males, two adult females. Rosenow's patient had been suddenly seized with a chill, fever, frequent, painful, and bloody urination. Townsend's patient reported that his attack had come on suddenly while he was at work, and had shown itself in severe urethral pain, which recurred with each urination. Curtis' patient gave a history of more gradual onset, applying for relief a full year after the trouble started. She complained of marked distress on urination, accompanied by the passage of small concretions from the bladder. My patient applied for treatment after he had noticed blood in his urine intermittently during two months previous. The blood was noticed particularily at the termination of the urinary act. He had only slight pain, no frequency, and no tenesmus.

An alkaline urine was present in all four cases and blood was a constant symptom. Townsend suggests that there is a more than accidental connection between the appearance of the staphylococcus and the disappearance of the pseudodiphtheria bacillus as noted in his case, seeing therein a relationship similar to the results claimed to occur in diphtheria, where the bacillus of Loeffler has disappeared as the staphylococcus has become a factor in the disease. In my case, however, both organisms were abundantly present when the urine was first studied. Eight months later the pseudodiphtheria bacillus was absent from cultures, while at present, nearly four years later, two cultures made a week apart both show the pseudodiphtheria together with b. coli and pneumococci, but the staphylococcus cannot be demonstrated.

That all four cases so far reported of membranous cystitis non-diphtheritic in origin showed the presence of the pseudodiphtheria bacillus either in large numbers or in pure culture is certainly strong presumptive

evidence of the pathogenicity of this organism, but we must not lose sight of the fact that its disappearance from the urine has not, in any case reported, been followed by a cure of the cystitis or even by a disappearance of the membrane.

Urologists are inclined to look askance upon a diagnosis of "uncomplicated chronic cystitis." In none of these four cases was there discoverable any focus of infection outside of the bladder. In my case, the administration of diphtheria antitoxin had no influence over the course of the disease and it is noteworthy that while the bladder was highly intolerant of any form of local treatment both before and after suprapubic drainage, still, while the bladder was draining above, comparatively strong solutions of nitrate of silver, permanganate, bichloride of mercury, and of tincture of iodine could be used through the suprapubic opening without causing any disturbance. This suggests that the extreme sensitiveness was dependent not so much upon the reaction of the bladder mucosa as upon that of the posterior urethra, or else that the bladder at rest is tolerant of otherwise irritating solutions.

I tried autogenous vaccines faithfully in all sorts of doses and in all sorts of intervals between doses. I was unable to observe the slightest benefit from their use. Local treatment was only harmful, increasing the patient's discomfort. The only procedure that gave him prolonged relief from his painful urinary symptoms was vesical drainage. I drained his bladder suprapubically for two and one-half months, and when this opening was permitted to close, the patient was fairly comfortable for seven months thereafter. Then an attempt at cystoscopy rekindled all of his painful symptoms. Later, his bladder was again drained during a considerable period in an Eastern clinic where he spent eight months. The

only improvement noted in his bladder symptoms on his return was somewhat less frequency and tenesmus. Pus, blood, and shreds of pseudo-membrane were still present in his urine, and his bladder capacity was not over 200 c.c. His local condition remained stationary until about one month ago, when, without any apparent cause, he began to grow worse. He now has a maximum bladder capacity under pressure of 120 c.c. He voids about every one-half hour while up and about every hour while in bed. His urine is heavy with pus and blood and he passes, at times, much pseudo-membrane. His history follows:

B. G., white, male, aged 20. Family history negative. Personal history negative. Never had venereal infection. Applied for treatment Oct. 23, 1913. For previous two months he had been intermittently passing blood in his urine. Bleeding was more marked at termination of urinary effort. Stream always free. Pain on urination only occasional, and then slight. Did not void after retiring, and about every two and one-half hours while up. Never had had any urethral instrumentation.

Examination showed a slender, well-nourished young man, weight about 120 pounds. Heart and lungs negative. Urine highly cloudy, blood-tinged, alkaline, trace of albumen. Microscopically: blood, pus, many gram positive cocci and bacilli.

The urine was studied by Dr. Lanford, the pathologist to Touro Infirmary, who reported as follows: "Smears and cultures were made from the urine sediment. Stained smears showed many polymorphonuclear leucocytes and gram positive bacilli together with a few cocci. The cultures derived from plating gave two varieties of bacteria which correspond in morphology to those noted on smear examinations. It is noteworthy that no other species grew out from the planted urine material. Cultures of the

coccus on blood serum and plain agar produced a canary-yellow pigment and later were identified as staphylococci citrii. The bacillus, isolated for the most part, grew as small dew-drop-like colonies. When staining with Loeffler's methylene blue, there was noted much irregularity in the bacilli; many barred forms and occasional ones showing polar granules were observed. Sub-plants from this culture were carried into dextrin and saccharose serum waters, and, after forty-eight hours incubation at 37½°C., no change was noted in the dextrin, but the saccharose was strongly fermented and coagulated. A portion of the urine sediment was inoculated intraperitonealy into a guinea-pig, and the pig remained healthy. The cultural characteristics and non-pathogenicity for animals of this bacillus of diphtheria morphology point rather conclusively to its being one of the pseudo forms of the b. xerosis group."

A few days after the patient was first seen and before the bacteriological examination of his urine had been completed, he was cystoscoped. Bladder capacity, about six ounces. Covering the entire right half of the trigone was seen a grayish membrance. This membrane was fairly adherent to bladder wall, bleeding being produced where it was brushed off with a catheter. Small patches of membrane were seen to left and above left ureter ostium. Right orifice was hidden by membrane and could not be identified. The uncovered portion of the bladder mucosa was intensely infected. No effort was made to catheterize the ureters at this examination.

The bladder was irrigated once daily for two weeks with a weak permanganate solution through a small soft catheter. At the end of this time, there being no change in the appearance of the urine, patient was again cystoscoped. No change was noted from previous picture except the addition of a small fringe

of membrane attached to the upper internal meatus. A few days later, bladder was irrigated with 1–5,000 solution of silver nitrate through a soft catheter. All of the patient's really troublesome bladder disturbance dates from this irrigation. There was immediately a marked increase in urinary frequency, accompanied by much tenesmus and increased quantity of blood. A week later I again cystoscoped him. This examination gave rise to considerable pain, the bladder being much less tolerant to instrumentation than formerly. This time, the trigone was seen to be free of membrane, but membrane covered almost the entire bladder mucosa besides. Both ureters were catheterized. Both kidneys were functioning normally, and urines from both kidneys were negative chemically, microscopically, and on cultures. No acid-fast bacilli were found in bladder urine, and guinea-pig inoculation was negative for t. b.

By mouth, the patient was given at different times such drugs as experience suggested might be of benefit. Large doses of acid phosphate of soda and of benzoic acid, either during the same or different periods, rendered the urine neutral to litmus only while they were being taken. He took santal oil, hexamethylenamin, hyoscyamus, and syrup of the iodide of iron at various times. At one time, I kept him in bed for two weeks and administered 3,000 units of diphtheria antitoxin. No improvement was noted to follow any of these measures. Finally, after he had been under treatment for eight months, I did a suprapubic drainage (May, 1915). Bacteriological study of the urine made by Dr. Lanford just before operation showed the flora of the bladder urine unchanged from previous examination. Following bladder drainage, patient had immediate relief from all of his painful urinary symptoms. He felt well and began to put on weight.

Through the suprapubic opening, the bladder was irrigated with various antiseptic solutions. Nitrate of silver, bichloride of mercury, and tincture of iodine were the ones used most persistently. It was interesting to observe how tolerant the bladder was of comparatively strong solutions of these drugs when introduced through the suprapubic tube when, previously, it had been highly sensitive to much weaker dilutions of the same character by catheter. After ten weeks, the tube was withdrawn, and the bladder closed in four days. The patient was then free from any disturbing urinary symptoms for seven months. He urinated about three times during the night and about every two or three hours during the day, but his urine still showed much pus, blood, and membrane. He gained twenty-seven pound.in weight. Catheterized specimens of urine studied by Dr. Lanford at this time were reported upon as follows: "Smears and cultures show staphylococci and a gram positive lancet-shaped organism in pairs, and a gram negative bacillus. Pure cultures of these organisms were recovered and identified as staphylococcus citreus pneumococcus, and bacillus pyocyaneus." It will be noticed that the pseudodiphtheria organism was not found in the urine at this examination.

On February 2, 1915, I again attempted to cystoscope patient, using a No. 18 Fr. instrument, but the introduction of the cystoscope into the posterior urethra caused so much pain that I desisted. Following this instrumentation, the patient had a return of all of his painful symptoms, more especially of the tenesmus and frequency. After some months of further treatment, with no relief, at my suggestion he visited an Eastern clinic. Here, I understand, the bacillus pyocyaneus and staphylococcus albus were recovered from the bladder urine. As nothing much was accomplished by local treatment, his blad-

der was opened (Oct., 1915) and ulcerated areas in the bladder surface were cauterized with the actual cautery.

He returned, slightly improved symptomatically but with no apparent change in the pathological condition of his urine. He did fairly well until about a month ago. He was able to retain his urine for from one to two hours during the day and voided about four times at night. Then he came to me with the statement that, without any cause of which he was aware, his bladder disturbance had recurred and that he was suffering more than at any time since his trouble started. He was unable to retain more than 60 c.c. of urine at any one time, and voided so frequently at night that his rest was much disturbed. He had lost fifteen pounds in weight. By rectum, prostate and vesicles are negative, but much thickening is palpable in the region of his bladder. His urine contains pus, blood, and shreds of pseudo-membrane. In his latest report on his study of patient's urine, Dr. Lanford says: "Examination shows large quantities of pus and blood and a fibrinous exudate. Stained smears shows organisms morphologically b. coli, b. xerosis, and pneumococci. Plants of the urine sediment gave a growth of the two first organisms, the pneumococcus being crowded out by the vigorous growth of the b. coli."

I am at present attempting to dilate the bladder with a hand syringe, injecting a solution of bicarbonate of soda until the washings return clear, and then instilling a 10% solution of silvol. He shows some improvement under treatment.

I desire to express my thanks to Dr. J. A. Lanford for his painstaking study of the bacteriological side of the case.

A SIMPLE YET ACCURATE METHOD OF DETERMINING THE SOURCE OF PUS IN URINE.

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The test which I shall present to-day is one that has been a part of my routine work for the past three years. I have found it extremely serviceable in a certain class of cases, and have been saved many cystoscopic examinations by its use. This has been gratifying to the patients as well as to myself. It had not appealed to me, however, as anything markedly different or unusual, until a physician, whom I had occasion to examine thus, became very enthusiastic over it. He had had two cystoscopic examinations elsewhere without a definite diagnosis being made, and by means of this technique we were able, in a few minutes, to locate the cause of his trouble in his prostatic urethra and adnexa with only a soft rubber catheter.

On looking into the matter more carefully, I found that no mention was made of this procedure in any of the standard texts obtainable. I then became more definitely interested in it myself and felt that I had really stumbled into something new, and so reported my findings at a meeting of the North Texas Medical Association. However, my delusion was short-lived, for there I had called to my attention the fact that the same technique had been used some forty years ago and had found its way into the diagnostic scrap heap. So now as a sadder and wiser man, I am simply calling

this to your attention as a valuable test that has been so overshadowed by the advent of the cystoscope that we have forgotten it entirely.

The problem is to determine the source of pus which is clouding the second glass of the classical two-glass test.

Aside from a few rare exceptions, this pus has three possible sources in the male patient. The first is the prostatic urethra and its adnexa, the prostate gland and seminal vesicles. The second is the bladder, and the third possible source of this pus is the right and left kidney with their ureters.

We have all known that in an acute specific infection of the posterior urethra, the pus frequently fills this part of the urethra and seeps back into the bladder through the relatively weak internal vesicle sphincter, there to be mixed with the incoming urine and poured out in the second glass.

In Finger's classical work on gonorrhœa, as early as 1889, we find the following: "If the posterior urethritis is *very acute*, the second urine is always cloudy; if it is subacute and the quantity of pus smaller, the second urine will only be cloudy after prolonged retention." This, because he had already proven that in undue distension of the bladder, the internal sphincter opens and allows the bladder and prostatic urethra to become one cavity, and of course then the bladder urine would be mixed with the pus in the prostatic urethra. However, few of us have realized that for years after the *acute stage* of the involvement, the resulting *chronic prostatic* and *vesicular infection*, which has been quiet for so long, may become more or less acute again, and may thus give rise to an irritation of the bladder neck, with such an increase of the pus produced, that it again fills the posterior urethra and overruns into the bladder. And, as a result, we have a man in the forties, with an irritable bladder,

with pus in the second glass of urine — a class of cases frequently very difficult to classify, and in just this class of cases is the following test most helpful.

After having a patient void in two glasses and finding the second cloudy with pus, we then introduce a soft rubber catheter into the bladder and wash the bladder out by filling it with clear solution. If, in doing this, we find the returning solution is clear and clean on the first or second washing, we may be sure that the bladder surface is not the source of the pus (this fact has been emphasized by many writers). Next, we so adjust the catheter that the urine, as it is emptied into the bladder from the ureters, will pass into the eye of the catheter and run directly out into a test-tube held for collecting this specimen. The proper placing of the catheter is the only step that requires any special attention, but the proper position may soon be learned by slowly changing the catheter if you do not very promptly begin to get the intermittent droppings, such as is seen from the ureter catheters. For when it is properly placed you have a succession of drops with an interval of rest just as you do from the ureter catheter, and such intermittent droppings are proof that the catheter is properly placed, and should be held here until a satisfactory specimen is obtained. If this specimen thus collected is clear and clean, containing no pus, you may be positive that the infection is not located in the kidneys or the ureters. In which case we are justified in being positive that the pus is coming from the prostatic urethra, since the easy cleaning of the bladder has already ruled out this organ.

In case the bladder cannot be cleaned by one or two washings, we must then conclude that the bladder surface is inflamed and is producing at least a part of the pus in the urine. But since we believe that inflammation of the vesicular mucous membrane is

practically always secondary, we must search further for the primary infection. Hence we now continue to wash the bladder repeatedly until the returning solution is clean, just as we do in washing out the anterior urethra in the classical second glass test; after which we proceed as detailed above for collecting the specimen from the kidney. If this collected specimen is clear and sparkling, we may be positive that the upper urinary passages are not involved. Cystoscopy should then be done, but in a great many cases ureteral catheterization will not add any information.

When the collected specimen, or glass number 3, is cloudy and turbid with pus, we are forced to believe that the kidneys are, in part at least, responsible, and a complete cystoscopy must then be done. This test is easily understood and applied and needs no special training of any kind, hence may be used with great advantage by those forward-looking general practitioners and general surgeons who are out of reach of a competent cystoscopist. They will, in a certain percentage of cases, be able by this means to make a positive diagnosis, and they will thus be brought to realize the urgent need of a careful urological study of all their cases.

To the cystoscopist, himself, it is of assistance frequently:

First, in those cases where we are unable to catheterize the ureters. Here often may be given the clew to the correct interpretation of the case in hand.

Second, in children too small to cystoscope satisfactorily, we are many times able to determine the source of the trouble, as in the case of a girl of six years, referred to me by Dr. Carroll of Dallas. A diagnosis of stone in the bladder had been made on the symptoms, which were frequency and painful urination, both day and night. No symptoms referable to kid-

neys at all. *X*-ray negative for stone. The above test applied, showed bladder clean, or practically so, and the specimen collected from the kidneys through the catheter was as milky as the specimen found in the bladder on first introduction of the catheter, which made at once a diagnosis of trouble in one or both kidneys. Thus in pyelitis of childhood, it will often corroborate your diagnosis, with little pain to the child and no difficulty for yourself.

Third, as a part of my routine in the examination of cases of prostatic hypertrophy, I obtain a specimen through the catheter, from the kidneys, by this technique, and I am often rewarded by knowing that the case is or is not complicated by pyelonephritis, since the clear specimen from the kidney tells me that the infection has not proceeded beyond the bladder, and vice versa.

Fourth, and by far the most important, in cases of men past forty with bladder irritation and showing a cloudy second glass. These are frequently very difficult to diagnose, having to decide between prostatic hypertrophy, prostatic infection, infection of the seminal vesicles, and some kidney or bladder condition. We should not lose sight of the fact that non-gonorrhœal as well as gonorrhœal infections of the prostate and seminal vesicles are frequently perpetuated for many years, and at intervals have periods of acute exacerbation, when a large amount of pus is poured into the prostatic urethra and into the bladder. With this exacerbation, you usually have the classical symptom complex of a frank cystitis. But in these cases, just as in infections of the kidneys, the bladder involvement and irritation is purely a secondary matter, and is usually limited to a congestion of the cysticum coli, and clears up very promptly when the feeding focus is found and corrected. Hence a negative history of gonorrhœa should not distract our

attention from the prostatic urethra and adnexa, as the cause of a bladder irritation.

Another fact, of which I have been convinced, is that a focus of infection in the vesicles may be the cause of such an irritation of the bladder with pus in the second glass, when palpation of these structures does not reveal any marked induration or change. Or, if indurated and palpable, they do not give one the impression of being in the acute stage of an inflammatory process.

In this class of cases, even after cystoscopy, we are frequently in doubt, as shown in the case of Dr. A., referred to me by Dr. Boyce of Dallas. He had been cystoscoped twice in Eastern clinics and had had both ureters catheterized without a positive diagnosis. With this test, in five minutes, I proved to his own mind that the pus could not possibly be coming from any place other than his prostatic urethra, for the bladder cleaned easily and the collected specimen from the kidney was as clear and sparkling as normal urine. The correctness of this conclusion was proven by a complete subsidence of symptoms and clearing of his urine, following routine treatment for an infection of the prostate and prostatic urethra.

The second case that I shall report in this class is that of a boy, 17 years of age, who comes for an intense irritation of the bladder, having to void very frequently both day and night. This had been troubling him since he was a small boy of four or five years, gradually getting worse. He had never had any venereal disease and in every other way was well and strong. Both glasses of urine were very cloudy with flakes and short shreds. I used this test and found that his bladder cleaned easily with two washings and the specimens I obtained from the kidneys through the inlaying catheter were as clear and sparkling as normal urine. This at once convinced me that his prostatic urethra

and adnexa were the source of all his pus, and I began to see immediate improvement in his symptoms and urine as soon as routine treatment for this condition was started. Now our findings could not have been any more satisfactory had we gone along and cystoscoped him and catheterized his ureters, and I feel that the way it was handled was very much better for the boy.

In this class of cases heretofore, we have gone through the tedious and painful process of cystoscopy and ureteral catheterization, only to record a negative view of the bladder and two clean specimens from the kidneys. This has been the experience of too many of you to need more than passing mention. Now with this test, we can be as accurate in our negation of the bladder and kidneys as the source of the trouble, and just as positive in convicting the prostatic adnexa.

Fifth, as a preliminary step to the cystoscopic study of all cases showing a cloudy second glass. Why? First, because I feel that it gives me, together with a good history and a good general examination, a better background on top of which is to be placed my cystoscopic findings. I have long since refused to cystoscope a case until I have made a complete general physical examination myself, or until I have the result of such an examination, made by someone on whom I am confident I can depend, for I am sure that with such an examination as a ground work, we are in a much better position to interpret our cystoscopic findings. Thus I have found that the above test is frequently a valuable addition to the groundwork upon which we are to rear our cystoscopic diagnosis.

To the unitiated, the cystoscope is an all-powerful, all-knowing creature, which will, on being introduced into the bladder and a button pushed, produce a complete picture of the entire urinary apparatus. But we who follow it day by day know that frequently we are left in doubt, even after a most careful use of it.

And in such cases I have found that the above test frequently gives us a cross-fire view of the situation, which, taken with the rest of the information at hand, leads us at last to the light.

Glass I is the second glass of the ordinary two-glass test. This we take as our starting point when it shows a definite cloudiness due to pus.

Glass II is obtained by washing the bladder with clear sterile boric acid solution. This is recorded clear, as in Figs. 1 and 2, when one or two washings of the bladder cleans it thoroughly so that the returning solution, when caught in the collecting glass, is clear and shows no cloud. This second glass is recorded slightly cloudy as in Figs. 3 and 4, when more than two washings are required to thoroughly clean the bladder; or, in other words, when the water from the third filling of the bladder is cloudy when caught in the collecting glass.

Glass III is obtained by leaving the catheter in place and collecting a specimen through it, and is recorded as clear when it shows no cloud when examined by transmitted light, but looks clear and sparkling as normal urine. If cloudy to the eye it should be examined, for the cloud may be due to other factors than pus.

A specially designed catheter with slight shoulder as seen in Fig. 5, to hold catheter in proper place and prevent slipping out of bladder, three eyes are provided so that the urine can readily find its way out of the bladder as it is poured into it from the ureters.

Fig. 1.

Glass I.	II.	III.
Cloudy.	Clear.	Clear.

Fig. 2.

Glass 1.	II.	III.
Cloudy.	Clear.	Cloudy.

Fig. 3.

Glass 1.	II.	III.
Cloudy.	Cloudy.	Clear.

Fig. 4.

Glass I.	II.	III.
Cloudy.	Cloudy.	Cloudy.

Fig. 5.
Specially designed Catheter.

DISCUSSION

OF PAPERS OF DRS. SIMONS, NELKIN, AND FOLSOM.

DR. WILLIAM S. EHRICH, Evansville, Ind.: In regard to Dr. Simons' paper, I enjoyed it very much, because his views and my own agree in almost every particular. I am very fond of irrigating the kidney pelves in pyelitis, and, as Dr. Simons says, I find the medicament used makes very little difference. In colon infections I have found the aluminum acetate solution very satisfactory. However, I have not used it to any great extent, because I find it is much more convenient to use argyrol or some other substance that is more or less bacteriacidal for all organisms that may infect the pelvis. So far as putting a catheter into an acutely inflamed pelvis is concerned, I do not like it. The introduction of the catheter must of necessity cause traumatism to the acutely inflamed surface, and therefore if the catheter must be introduced it should be only for medicating the pelvis.

Dr. Folsom's paper was quite delightful, and I think it is a fact that we urologists are all too prone to use the cystoscope on less provocation than we probably should. I must confess to being guilty. Another thing that the Doctor said is very true, the general practitioner sending in a case and asking that it be cystoscoped and a diagnosis be made at once. The question is what are we going to do with these cases. My practice is to report just what I see and let the physician who referred the case make his own diagnosis.

DR. C. R. O'CROWLEY, Newark, N. J.: In regard to lavage, I would like to report a very interesting case. About ten years ago there came into Dr. Guiteras' clinic at the Post-Graduate a Russian. He had a pyuria, frequency, and dysuria. We finally got him into the cystoscopy room, after going through some of the other rooms, and we cystoscoped that man and found that we got purulent urine from each kidney. The late Dr. Saxe studied this case out very carefully, and he and Harlow Brooks isolated gonococci from the collected specimens. To antedate this a little bit, I will give his history. When he was in Russia they were recruiting in one of the small towns. If a man had a venereal disease he was unfit for military service. He knew a friend who had gonorrhœa. He had him urinate in a glass, drew up a syringe full of the urine and injected it into his bladder. None of it came back. You can imagine the condition he set up in himself. So,

after he landed in New York, we got him in the Post-Graduate. After isolating the gonococcus from each kidney we made a diagnosis of renal gonorrhœa. At that time there were only nine cases reported in the literature. They were doing lavage of the renal pelvis there once a week on this man, with every conceivable silver solution on the market at that time, and the best result we got, so far as clearing his urine up was concerned, was with a preparation put out by the Lederle Laboratories of colon bacilli. This man to-day is practically in the same condition. He still has his pyelonephritis, and is being washed out at Dr. Ayres' office.

DR. H. L. KRETSCHMER, Chicago: I should like to make a few remarks about Dr. Simons' cases. I believe these cases must be treated until they are not only free from pus but free from organisms. I believe the relapses are due to the fact that they are let go before bacteriological cures are obtained.

In regard to Dr. Folsom's paper, I am not in favor at all of unnecessary cystoscopies, and like to spare the patient unnecessary cystoscopy just as much as he does, but it seems to me that in this day and age of accuracy I should feel better satisfied in cases of pyuria to exclude the upper urinary tract by cystoscopy and ureteral catheterization. If a patient has a diverticulum on the posterior aspect of the bladder or an infection in the bas fond, your catheter could lie on the base of the bladder and perhaps get clear urine.

DR. FOLSOM, in closing: I should only like to emphasize the fact that the method is presented, not as a wholesale substitute for cystoscopy at all, for only in one class of cases do we depend altogether on its results, viz: in those cases where all the pus is coming from the prostatic urethra and adnexa. In this class of cases I do feel absolutely sure that you can depend on it, and I am also firmly convinced that it is far better in these cases than cystoscopy, because its findings are accurate and it is far less apt to be followed by an acute febrile reaction so frequently seen when you cystoscope a case of this character.

I also feel that in the hands of good general men, unskilled in the use of the cystoscope, it will be of decided value.

A NEW COMBINATION OBSERVATION, CATHETERIZING, AND OPERATING CYSTOSCOPE.

LEO BUERGER,
NEW YORK.

In previous communications [1] I described two types of cystoscopes, one for the purpose of examining the bladder and catheterizing the ureter, and the other for the execution of special operative manœuvres included under the caption "operative cystoscopy." Both of these instruments have been widely accepted as offering distinct advantages over most of the other cystoscopes previously in use, and have been used by me exclusively in my routine work for over eight years.

Because of differences in the shape of the sheaths, however, that of the catheterizing instrument being circular in cross-section and that of the operating cystoscope being elliptical, it was found impossible to introduce the operating telescope into the catheterizing sheath, so that two distinct instruments were found necessary. Thus, when the catheterizing instrument is applied in practice and a small calculus or a tumor discovered, it becomes necessary to resort to the operating cystoscope either for removing the calculus or for removing portions of a new growth for microscopic examination. Or, when a large catheter is deemed useful, a change of instruments becomes necessary, with the attendant discomfort and annoyance to the patient.

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[1] Buerger: *Annals of Surgery*, Feb., 1909.

About a year and a half ago, after some experimentation, I was able to develop a new type of sheath which permits of the passage, not only of the observation and catheterizing telescopes, but also of an operating telescope and its instrumental accessories. The advantages of such an instrument are apparent to anyone who has had experience in cystoscopic work.

Figs. 1 and 2 illustrate the concave and convex sheath of this instrument, their cross-sections being oval and but slightly larger than that of the catheterizing instrument. They are easily introduced and easily borne by the patient. In Fig. 2 the catheterizing telescope is shown. This allows of the introduction of two No. 7 French ureteral catheters and it varies in no way from the usual catheterizing telescope, except for the size of the lid or deflector.

As pointed out by me in previous publications, the combining of various types of cystoscopes into one instrument carries with it certain drawbacks which are also in a small measure represented in this instrument, although they are of very minor importance. Thus, the size of the deflector had to be diminished in this instrument, because of the narrowness or oval nature of the sheath, a somewhat narrower deflector being necessary to fit into the narrower sheath. The manipulation of the catheters, therefore, becomes slightly more difficult, but to the experience cystoscopist this feature offers no insurmountable obstacle to the easy catheterization of practically all cases.

As for the operating telescope (shown in Fig. 1), the lid has been made stronger than in the operating cystoscope, although the space for operating instruments is somewhat diminished.

All in all, however, the instrument offers so many decided advantages that it is regarded by me as the most useful cystoscope in my own armamentarium.

Fig. 1.
Convex Sheath with Operating Telescope introduced.

Fig. 2.
Concave Sheath with Catheterizing Telescope introduced.

DISCUSSION

OF PAPER BY DR. BUERGER.

DR. BRANSFORD LEWIS, St. Louis: I would like to discuss the instrument presented by Dr. Buerger, and express my admiration for his ingenuity in the development of these instruments. Of course, there is always room for improvement. That has been the case ever since Nitze invented the modern cystoscope in 1875 or thereabouts. I see that Dr. Buerger is tending toward simplification, but I do not understand exactly why he has two different sheaths to accomplish the object that may be accomplished by one sheath. I see in the box the instrument is supplied with two different sheaths through which the telescopes may be used interchangeably. Now for the last two years or so the same manufacturer, Wappler, has been making for me the instrument which has been designated as "The Universal and Operating Cystoscope," which consists of one sheath, fenestrated on both convexity and concavity, and supplied with two telescopes, so that the instrument is the extreme of simplification, and yet is wide in its sphere of usefulness. That one sheath with two telescopes is capable of supplying all the different views desired, double catheterization by direct and indirect methods, and also for using all of the different operating instruments that are supplied for ureteral or intravesical operating, utilizing all those smaller instruments that have been in use for some time. So that instead of using one sheath and taking that out and putting in another, after one introduces the one sheath he can then use the cystoscope for observation, for double catheterization by direct or indirect method, and all of the various operating instruments. And of course the excellent lenses that are made by Wappler are supplied in the same instrument. To me it has been extremely simple as well as serviceable in a practical way.

A DEVICE FOR THE CONTROL OF HEMORRHAGE FOLLOWING SUPRAPUBIC PROSTATECTOMY.

H. G. HAMER,
INDIANAPOLIS, IND.

Of the many methods suggested to control hemorrhage following suprapubic prostatectomy, viz., gauze packing, fat implantation, etc., the use of the inflated rubber bag of Francis R. Hagner of Washington, D.C., has been found most satisfactory. After the enucleation of the prostate is completed, a curved staff is inserted through the urethra into the bladder and its tip made to protrude through the suprapubic opening. Over the protruding end of the sound or staff the rubber tube which is attached to the bag is pushed. The sound is then withdrawn, drawing with it the tube which brings the rubber bag into the bladder. The bag is distended with air or water and then drawn down into and against the vesical orifice, thus compressing the cavity from which the prostatic tissue was removed. Hemorrhage can only be controlled if this inflated bag is held securely in position. One of the difficulties encountered has been fixation of the bag in position. Usually this has been done by clamping the tube where it emerged from the penis, or the outer end of the tube was drawn down on the thigh and fastened by means of adhesive straps. Both of these methods were insecure, and if much tension was made upon the tube following the former method a great deal of soreness of the urethra followed, due to constant pressure upon the meatus.

I am indebted to my friend, Dr. Carl Lewis Wheeler of Lexington, Ky., for the suggestion and emphasis of the need of some mechanical device which would maintain direct pressure over the operated area after prostatectomy and for his description of the device of Dr. Townsend of Rutland, Vt. In a conversation last October he and I agreed to each try to develop some method of exerting pressure for control of hemorrhage, and the device presented is the result of the efforts I have made in that direction and its practical application has demonstrated its value. In October, 1916, I devised the wire anchor here presented for the purpose of accurately fixing the pressure bag after the latter has been properly placed and dilated with air. Immediately after the operation the Hagner bag is drawn through the bladder in the usual manner. The tube from the bag is brought through the hole in the summit of the wire anchor. The bag is then distended by injecting air from a large syringe. Tension is made on the tube, bringing the bag down into the neck of the bladder with as much pressure as desired, and held in this position by the little screw clamp just outside the hole in the summit of the wire anchor. The anchor is made of soft copper wire of sufficient size to have some rigidity and sufficient strength to hold any tension that might be made upon it for this purpose. The flexibility of the wire anchor allows it to be molded to fit the individual case. It is not in the way of the dressings which may need to be changed before the removal of the Hagner bag, which is usually allowed to remain from 24 to 48 hours in order that any recurrent hemorrhage may be immediately controlled. I presented miniature models of the device to Dr. C. E. Burford of St. Louis and to Dr. Carl Lewis Wheeler of Lexington, Ky., last fall. Later on I sent regular-sized models to Dr. Wheeler and also to Dr. Hugh Cabot of Boston. Dr. Wheeler, I believe,

presented the appliance before his local medical society at Lexington, and it was described by Dr. Wishard at the Evansville meeting of the Ohio Valley Medical Association, November 22, 1916. The apparatus has been in constant use by Dr. Wishard and myself in some twenty-five suprapubic prostatectomies during the past four months and has worked most satisfactorily.

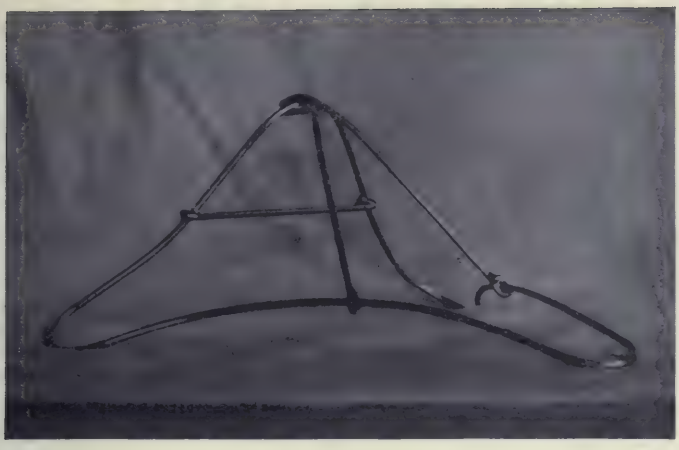

Fig. 1.

Fig. 2.

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Kretschmer, H. L. .....122 So. Michigan Blvd., Chicago, Ill.
Krotozyner, Martin .....999 Sutter St., San Francisco, Cal.
Kurtzeborn, Edwin .....3532 Washington Ave., St. Louis, Mo.

Lahey, F. H. .....638 Beacon St., Boston, Mass.
Landrum, A. B. .....246 East State St., Columbus, Ohio
LaRose, V. J. .....City Nat'l Bank Bldg, Bismarck, N. D.
Laurie, Thomas F. .....Auburn, N. Y.
Lauterman, M. .....196 Peel St., Montreal, Can.
Laws, W. V. .....Dugan-Stuart Bldg., Hot Springs, Ark.
Lehr, L. C. .....1737 H St. N. W., Washington, D. C.
Leiter, H. L. .....608 East Genesee St., Syracuse, N. Y.
Leonard, Veder N. .....330 Park Ave., New York City
L'Esperance, O. R. T. .....110 Boylston St., Boston, Mass.
Lespinasse, Victor D. .....7 West Madison St., Chicago., Ill.
Lewis, Bransford.....550 Century Bldg., St. Louis, Mo.
Lieberthal, David .....31 No. State St., Chicago, Ill.
Likes, S. H. .....1134 Linden Ave., Baltimore, Md.
Linneman, N. L. .....510 Fidelity Bldg., Duluth, Minn.
Lippincott, A. H. .....406 Cooper St., Camden, N. J.
Livermore, G. R. .....1308 Exchange Bldg., Memphis, Tenn.
Lockwood, C. D. ..Citizens Savings Bank Bldg., Pasadena, Cal.
Loewe, G. M. .....108 No. State St., Chicago, Ill.
Loree, I. D. .....1st Nat'l Bank Bldg., Ann Arbor, Mich.
Loux, H. R. .....1819 Walnut St., Philadelphia, Pa.
Lower, W. E. .....222 Osborn Bldg., Cleveland, Ohio
Lownes, J. B. .....1849 No. 19th St., Philadelphia, Pa.
Lowsley, Oswald S. ...The Wyoming, 55th St., New York City
Lund, H. G. .....600 Carleton Bldg., St. Louis, Mo.
Lydston, G. Frank .....815 Reliance Bldg., Chicago, Ill.
Lyon, H. N. .....Humboldt Bldg., St. Louis, Mo.
Lyons, Oliver .....Metropolitan Bldg., Denver, Colo.

McCallum, F. M. .....721 Lathrop Bldg., Kansas City, Mo.
McCarthy, F. G. .....634½ Wabash Ave., Terre Haute, Ind.
McCarthy, J. F. .....40 East 41st St., New York City
McClinton, N. F. .....Weichmann Block, Saginaw, Mich.
McCollom, W. E. .....1174 Dean St., Brooklyn, N. Y.
McConnell, E. G. .....406 Sutter St., San Francisco, Cal.
McCown, P. E. ...623 Hume-Mansur Bldg., Indianapolis, Ind.
McGlasson, I. L. .....223 Peerless Bldg., Waco, Texas
McGonigle, M. B. .....237 Michigan St., Toledo, Ohio
McIntyre, H. B. .....117 East 62d St., New York City
McKenna, C. M. .....2009 Marshall-Field Annex, Chicago, Ill.
McKim, G. F. .....Union Central Life Bldg., Cincinnati, Ohio
McKnight, E. J. .....110 High St., Hartford, Conn.
McLaughlin, A. J. .....6th and Pierce Sts., Sioux City, Iowa
McMartin, Charles .....419 Brandeis Bldg., Omaha, Neb.

McNulty, A. H. .....St. Paul Bldg., San Francisco, Cal.
MacGowan, Granville ....602 Lissner Bldg., Los Angeles, Cal.
MacKay, A. E. .....711 Oregonian Bldg., Portland, Ore.
MacKenzie, D. W. ...Royal Victoria Hospital, Montreal, Can.
MacKinney, W. H. .....1701 Chestnut St., Philadelphia, Pa.
MacMartin, D. R. .....20 West Jackson Blvd., Chicago, Ill.
Mahoney, J. J. .....25 East Washington St., Chicago, Ill.
Manton, W. P. .....32 Adams Ave. West, Detroit, Mich.
Marchildon, J. W. .....Humboldt Bldg., St. Louis, Mo.
Mark, E. G. .....626 Lathrop Bldg., Kansas City, Mo.
Martin, Clarence .....3700 Morgan St., St. Louis, Mo.
Martin, E. H. .....Dugan-Stuart Bldg., Hot Springs, Ark.
Martin, Edward .....1506 Locust St., Philadelphia, Pa.
Martin, Sergeant P. .....Electric Bldg., Buffalo, N. Y.
Martin, W. C. .....601 David Whitney Bldg., Detroit, Mich.
Martin, W. F. .....The Sanitarium, Battle Creek, Mich.
Mason, Frederick S. .....12 Fifth Ave., New York City
Matteson, G. A. .....276 Benefit St., Providence, R. I.
May, B. F. .....Humboldt Bldg., St. Louis, Mo.
Mertz, H. O. .....806 Maple Ave., La Porte, Ind.
Meyer, Henry .....240 Stockton St., San Francisco, Cal.
Meyer, H. E. .....Hampton, Iowa
Meyer, Willy .....700 Madison Ave., New York City
Miller, G. Brown .....1730 K St., Washington, D. C.
Mitchell, Alfred, Jr. .....657 Congress St., Portland, Me.
Mixter, C. G. .....180 Marlborough St., Boston, Mass.
Molony, Martin .....Head Bldg., San Francisco, Cal.
Monae-Lesser, A. .....164 West 72d St., New York City
Moore, E. C. 1007 Merchants Nat'l Bk. Bldg.,Los Angeles, Cal.
Moore, H. M. .....Wall Bldg., St. Louis, Mo.
Moorehead, S. W. .....1506 Locust St., Philadelphia, Pa.
Morris, R. L. .....545 Powers Bldg., Rochester, N. Y.
Morton, H. H. .....32 Schermerhorn St., Brooklyn, N. Y.
Mowry, A. E. .....3505 Indiana Ave., Chicago, Ill.
Muellerschoen, G. J. .....1727 No. 15th St., Philadelphia, Pa.
Murphy, A. I. .....Westinghouse Bldg., Pittsburgh, Pa.

Neilson, Thos. R. .....1937 Chestnut St., Philadelphia, Pa.
Nelkin, A. .....305 Baronne St., New Orleans, La.
Newmark, Philip .....Marsh-Strong Bldg., Los Angeles, Cal.
Nordeman, H. F. .....65 West 45th St., New York City

Oakley, Frank .....432 Anisfield Bldg., Cleveland, Ohio
O'Crowley, C. R. .....12 Lombardy Street, Newark, N. J.

Ohlman, I. L. .....8122 Jenkins Arcade, Pittsburgh, Pa.
Oliver, M. S. .....239 East 51st Street, Chicago, Ill.
O'Neil, John P. .....Moraine Hotel, Highland Park, Ill.
O'Neil, R. F. .....379 Beacon St., Boston, Mass.
Ormsby, O. S. .....25 East Washington St., Chicago, Ill.
Orr, H. D. .....5 So. Wabash Ave., Chicago, Ill.
Osgood, A. T. .....40 East 41st St., New York City
Owre, Oscar .....706 Masonic Temple, Minneapolis, Minn.

Paine, Arthur Hilton .....270 Alexander St., Rochester, N. Y.
Patton, J. Allen .....Prudential Life Ins. Co., Newark, N. J.
Paul, T. M. .....King-Hill Bldg., St. Joseph, Mo.
Peck, G. A. .....189 Center Ave., New Rochelle, N. Y.
Peck, R. H. .....15 Temple St., Springfield, Mass.
Pedersen, James .....40 East 41st St., New York City
Pedersen, Victor C. .....45 West 9th St., New York City
Pemberton, Frank A. .....128 Bay State Rd., Boston, Mass.
Pentlarge, Victor H. .....380 Sterling Place, Brooklyn, N. Y.
Perry, H. J. .....45 Bay State Road, Boston, Mass.
Peterkin, G. Shearman .....1102 Cobb Bldg., Seattle, Wash.
Phelps, O. D. .....452 Main St., Worcester, Mass.
Philips, Geo. M. .....Commercial Bldg., St. Louis, Mo.
Phillips, Wm. Gray.....67 Hansen Place, Brooklyn, N. Y.
Pickrell, C. D. .....735 Century Bldg., St. Louis, Mo.
Pilling, G. P., Jr. .....4044 Chestnut St., Philadelphia, Pa.
Pitts, H. C. .....221 Thayer St., Providence, R. I.
Plaggemeyer, H. W. .1001 David Whitney Bldg., Detroit, Mich.
Porter, C. A. .....116 Beacon Street, Boston, Mass.
Porter, W. H. ..... 46 West 83d St., New York City
Potter, G. E. .....1491 Woodward Ave., Detroit, Mich.
Povey, H. Clayton .....39 Mott St., Newark, N. J.
Price, L. T. .....301 East Franklin St., Richmond, Va.
Putnam, C. R. L. .....121 East 38th St., New York City

Quimby, W. C. .....Peter Bent Brigham Hosp., Boston, Mass.

Radda, J. .....219 East 69th St., New York City
Randall, Alexander .....Professional Bldg., Philadelphia, Pa.
Rathbun, N. P. .....442 Greene Ave., Brooklyn, N. Y.
Ravogli, A. .....5 Garfield Place, Cincinnati, Ohio
Ravold, A. N. .....Jefferson Barracks, Mo.
Ray, Edgar T. .....824 St. Nicholas Ave., New York City
Read, J. Sturdivant .....174 Clinton St., Brooklyn, N. Y.
Reece, H. B. .....25 Park Ave., New York City

Reid, W. B. .....219 No. Washington St., Rome, N. Y.
Reilly, F. H. .....296 Columbus Ave., New Haven, Conn.
Reinle, G. G. .....1322 Broadway, Oakland, Cal.
Reynolds, W. S. .....132 West 73d St., New York City
Rhode, Max S. .....The Wyoming, 55th St., New York City
Ricketts, B. Merrill ...Cor. 4th and Broadway, Cincinnati, Ohio
Rigdon, R. L. .....619 Chronicle Bldg., San Francisco, Cal.
Robbins, Fred'r'ck W. 1212 Kresge Medical Bldg., Detroit, Mich.
Roberts, F. A. .....30 East Kinney St., Newark, N. J.
Robertson, W. M. .....Humboldt Bldg., St. Louis, Mo.
Robinson, W. J. .....12 Mount Morris Park, New York City
Rogers, D. W. .....2204 So. Michigan Ave., Chicago, Ill.
Rosenkranz, H. A. .....Story Bldg., Los Angeles, Cal.
Rosenthal, M. S. .....718 No. Howard St., Baltimore, Md.
Roth, L. J. .....811 Brockman Bldg., Los Angeles, Cal.
Rowley, A. M. .....803 Main St., Hartford, Conn.
Ruggles, E. W. .....348 University Ave., Rochester, N. Y.
Runo, Herman .....David Whitney Bldg., Detroit, Mich.
Rytina, A. G. .....312 Professional Bldg., Baltimore, Md.

Sanford, H. L. .....207 Osborn Bldg., Cleveland, Ohio
Sasover, Lazar .....131 East 115th St., New York City
Sawyer, A. R. .....6 Conway St., Roslindale, Conn.
Schapira, S. W. .....1847 Madison Ave., New York City
Scherck, H. J. .....309 Century Bldg., St. Louis, Mo.
Schmid, Henri .....707 Jenkins Bldg., Pittsburgh, Pa.
Schmidt, L. E. .....5 So. Wabash Ave., Chicago, Ill.
Schoenrich, H. .....1134 Linden Ave., Baltimore, Md.
Seay, Cornelius J. .....111 West 82d St., New York City
Seidler, Leon .....29 East Madison St., Chicago, Ill.
Senn, W. N. .....25 East Washington St., Chicago, Ill.
Seward, I. E. .....606 Osborn Bldg., Cleveland, Ohio
Shapira, Victor I. .....252 Huntington Ave., Boston, Mass.
Shelmire, J. B. .....511 Southwestern Life Bldg., Dallas, Texas
Shropshire, C. W. .....1st Nat'l Bank Bldg., Birmingham, Ala.
Shupe, Thos. P. .....222 Osborn Bldg., Cleveland, Ohio
Silverberg, M. .....1018 Head Bldg., San Francisco, Cal.
Simons, Irving .....178 8th Ave. No., Nashville, Tenn.
Sinclair, D. A. .....25 Park Ave., New York City
Siter, E. H. .....1818 So. Rittenhouse Sq., Philadelphia, Pa.
Slothin, George B. .....49 Niagara St., Buffalo, N.Y
Smejkal, H. J. .....3200 West 26th St., Chicago, Ill.
Smith, Clinton K. .....731 Lathrop Bldg., Kansas City, Mo.
Smith, E. B. .....76 Waterman St., Providence, R. I.

Smith, E. E. .....50 East 41st St., New York City
Smith, E. O. .....19 West 7th St., Cincinnati, Ohio
Smith, Frederick W. .....40 East 41st St., New York City
Smith, George G. .....99 Commonwealth Ave., Boston, Mass.
Smith, M. K. .....50 East 53d St., New York City
Smith, S. B. .....160 West 87th St., New York City
Smith, T. H. .....904 Kresge Medical Bldg., Detroit, Mich.
Snyder, W. H. .....202 Grand St., Newburg, N. Y.
Somers, Howard .....135 Stockton St., San Francisco, Cal.
Sommer, G. N. J. .....120 West State St., Trenton, N. J.
Spencer, J. C. .....135 Stockton St., San Francisco, Cal.
Spitzer, W. M. .....Metropolitan Bldg., Denver, Colo.
Squier, J. Bentley, Jr. .....49 East 49th St., New York City
Staley, R. W. .....63 Groton Bldg., Cincinnati, Ohio
Stellwagen, Thos. C., Jr. ...1831 Chestnut St., Philadelphia, Pa.
Stern, Chas. S. .....75 Pratt St., Hartford, Conn.
Stern, Maximilian .....219 West 81st. St., New York City
Stevens, A. R. .....40 East 41st St., New York City
Stevens, W. E. .....Shreve Building, San Francisco, Cal.
Stewart, Acheson .....Keenan Building, Pittsburgh, Pa.
Stewart, D. H. .....128 West 80th St., New York City
Stewart, Floyd .....Chemical Building, St. Louis, Mo.
Stokes, A. C. .....503 Brandeis Bldg., Omaha, Neb.
Strachstein, A. .....17 East 38th St., New York City
Suggett, O. LeGrand ..704 Metropolitan Bldg., St. Louis, Mo.
Summers, J. E., Jr. .....Brandeis Bldg., Omaha, Neb.
Sumney, H. C. .....W. O. W. Bldg., Omaha, Neb.
Swinburne, G. K. .....64 East 56th St., New York City

Ten Broeck, Louis L. .....Syndicate Bldg., Minneapolis, Minn
Tenney, Benjamin .....308 Marlborough St., Boston, Mass
Terry, H. .....97 Broad St., Providence, R. I
Thomas, B. A. .....116 So. 19th St., Philadelphia, Pa
Thomas, G. J. Physicians & Surgeons Bldg., Minneapolis, Minn
Thompson, Lloyd .....Dugan-Stuart Bldg., Hot Springs, Ark
Thomson, Alex. N. .....835 Park Place, Brooklyn, N. Y
Thorndike, Paul .....24 Marlborough St., Boston, Mass
Tilton, Benjamin T. .....14 East 58th St., New York City
Timberlake, Gideon .....330 No. Charles St., Baltimore, Md.
Townsend, T. M. .....171 West 71st St., New York City
Townsend, W. W. .....Rutland, Vt.
Traver, S. N. .....128 Locust St., Harrisburg, Pa.
Trueheart, Marion .....Sterling, Kan.

Valentine, J. J. .....171 West 71st St., New York City

Van der Poel, John .....56 West 52d St., New York City
Van der Veer, J. N. .....28 Eagle Street, Albany, N. Y.
Vecki, Victor .....203 Physicians Bldg., San Francisco, Cal.
Vickery, E. A. .....Surgeon General's Office, Washington, D. C.

Walker, Edwin .....712 So. 4th St., Evansville, Ind.
Walker, George .....Charles and Center Sts., Baltimore, Md.
Walker, R. S. .....503 Nicholas Bldg., Toledo, Ohio
Walsh, F. C. .....Moore Building, San Antonio, Texas
Walther, H. W. E. .....Macheca Bldg., New Orleans, La.
Ward, W. J. .....20 Fairmount Ave., Newark, N. J.
Ware, Martin W. F. .....27 East 81st St., New York City
Warren, G. W. .....117 East 62d St., New York City
Wathen, J. R. .....Gaulbert Bldg., Louisville, Ky.
Watson, F. S. .....92 Marlborough St., Boston, Mass.
Webb, Dudley .....409 Broadway, Cincinnati, Ohio
Weber, H. C. .....Courier-Journal Bldg., Louisville, Ky.
Weithas, R. C. .....813 Halsey St., Brooklyn, N. Y.
Welfeld, Jos. .....209 So. State St., Chicago, Ill.
Westerman, C. M. ..1345 Syndicate Trust Bldg., St. Louis, Mo.
Wettstein, J. C. R. .....221 No. 4th St., Effingham, Ill.
Wheeler, C. L. .....Trust Company Bldg., Lexington, Ky.
White, E. W. .....5 So. Wabash Ave., Chicago, Ill.
Whiteside, G. S. .....907 Journal Bldg., Portland, Ore.
Whiting, J. R. .....17 East 38th St., New York City
Whitney, C. M. .....386 Commonwealth Ave., Boston, Mass.
Wiggin, R. C. .....510 Commonwealth Ave., Boston, Mass.
Willard, W. P. .....177 Post St., San Francisco, Cal.
Williams, Ralph .....L. A. Investment Bldg., Los Angeles, Cal.
Willoughby, L. A. .....306 Wayne Bldg., Toledo, Ohio
Wills, W. J. .....Landers Building, Springfield, Mo.
Windell, J. T. .....715 West Jefferson St., Louisville, Ky.
Wise, Fred .....24 West 59th St., New York City
Wishard, W. N. .....Hume-Mansur Bldg., Indianapolis, Ind.
Wolbarst, A. L. .....113 East 19th St., New York City
Wolheim, J. L. .....179 East 79th St., New York City
Wolf, W. B. .....113 W. Franklin St., Baltimore, Md.
Woodruff, S. R. .....22 West 22d St., Bayonne, N. J.
Wose, A. M. .....404 East Genesee St., Syracuse, N. Y.
Wright, F. R. .....Donaldson Building, Minneapolis, Minn.
Wyeth, G. A. .....59 West 54th St., New York City

Youmans, T. G. .....1242 Neil Ave., Columbus, Ohio
Young, E. B. .....434 Marlborough St., Boston, Mass.

Young, E. L., Jr. .....87 Marlborough St., Boston, Mass.
Young, H. H. .....Johns Hopkins Hospital, Baltimore, Md.
Young, H. McClure .....600 Carleton Bldg., St. Louis, Mo.

Zigler, M. .....40 East 41st St., New York City
Zurawski, K. A. .....32 No. State St., Chicago, Ill.

American Urological Association.

GEOGRAPHICAL ROSTER.

ALABAMA.

Birmingham	Shropshire, C. W.	1st Nat'l Bank Bldg.

ARKANSAS.

Hot Springs	Collings, Howard P.	Dugan-Stuart Bldg.
"	Jelks, J. T.	Dugan-Stuart Bldg.
"	Laws, W. V.	Dugan-Stuart Bldg.
"	Martin, E. H.	Dugan-Stuart Bldg.
"	Thompson, Loyd	Dugan-Stuart Bldg.

CALIFORNIA.

Los Angeles	Cecil, A. B.	400 Marsh Strong Bldg.
"	Dakin, W. B.	403 L. A. Investment Bldg.
"	Day, R. V.	412 W. Sixth St.
"	Dillingham, F. S.	612 Lissner Bldg.
"	Hart, Lasher	1102 Title Insurance Bldg.
"	MacGowan, Granville	602 Lissner Bldg.
"	Moore, E. C.	1007 Mer. Nat'l Bank Bldg.
"	Newmark, Philip	Marsh Strong Bldg.
"	Rosenkranz, H. A.	Story Bldg.
"	Roth, L. J.	811 Brockman Bldg.
"	Williams, Ralph	L. A. Investment Bldg.
Oakland	Reinle, G. G.	1322 Broadway
Pasadena	Lockwood, C. D.	Citizens Sav. Bank Bldg.
San Francisco	Bazet, Louis	844 Phelan Bldg.
"	Cerf, A. E.	111 Ellis St.
"	Eaton, G. L.	Elkan-Gunst Bldg.
"	Friedlander, David	146 Grant Ave.
"	Gross, Louis	45 Kearney St.
"	Grosse, A. B.	Hastings Bldg.
"	Hartman, G. W.	1204 Sutter St.
"	Johnson, W. S.	350 Post St.
"	Krotozyner, Martin	999 Sutter St.
"	McConnell, E. G.	406 Sutter St.

San Francisco	McNulty, A. H.	St. Paul Bldg.
"	Meyer, Henry	240 Stockton St.
"	Molony, Martin	Head Bldg.
"	Rigdon, R. L.	619 Chronicle Bldg.
"	Silverberg, M.	1018 Head Bldg.
"	Somers, Howard	135 Stockton St.
"	Spencer, J. C.	135 Stockton St.
"	Stevens, W. E.	Shreve Bldg.
"	Vecki, Victor	203 Physicians Bldg.
"	Willard, W. P.	177 Post St.

COLORADO.

Denver	Davis, J. B.	Metropolitan Bldg.
"	Fowler, O. S.	631 Commonwealth Bldg.
"	Howard, T. L.	550 Metropolitan Bldg.
"	Lyons, Oliver	Metropolitan Bldg.
"	Spitzer, W. M.	Metropolitan Bldg.

CONNECTICUT.

Hartford	Bell, G. N.	44 High St.
"	McKnight, E. J.	110 High St.
"	Rowley, A. M.	803 Main St.
"	Stern, Charles S.	75 Pratt St.
New Haven	Barnes, W. S.	193 York St.
"	Kleiner, Israel	193 York St.
"	Reilly, F. H.	296 Columbus Ave.
Roslindale	Sawyer, A. R.	6 Conway St.

DISTRICT OF COLUMBIA.

Washington	Benton, F. L.	Navy Dept.
"	Fowler, H. A.	1621 Connecticut Ave.
"	Fuller, Homer G.	The Farragut
"	Hagner, F. R.	17th & I Sts.
"	Hooe, R. Arthur	The Burlington
"	Kemble, Adam	The Cecil
"	Lehr, L. C.	1737 H St. N. W.
"	Miller, G. Brown	1730 K St.
"	Vickery, E. A.	Surgeon General's Office

GEORGIA.

Atlanta	Boyd, M. L.	Candler Bldg.
"	Fowler, A. L.	929 Candler Bldg.

ILLINOIS.

Chicago	Baum, W. L.	30 No. Michigan Blvd.
"	Belfield, W. T.	32 No. State St.
"	Bevan, A. D.	122 So. Michigan Blvd.
"	Bremerman, L. W.	Monroe Bldg.
"	Cary, French S.	30 No. Michigan Ave.
"	Cobb, R. B.	5 So. Wabash Ave.
"	Corbus, B. C.	1027 Michigan Bldv. Bldg.
"	Eisendrath, D. N.	30 No. Michigan Ave.
"	Eisenstaedt, J. S.	32 No. State St.
"	Harris, M. L.	25 East Washington St.
"	Herbst, H. R.	32 No. State St.
"	Jones, W. Clay	25 East Washington St.
"	Kolischer, Gustave	108 No. State St.
"	Koll, I. S.	104 So. Michigan Ave.
"	Korby, G. J.	5 So. Wabash Ave.
"	Kraus, H. A.	25 East Washington St.
"	Kreissl, F.	1510 Kesner Bldg.
"	Kretschmer, H. L.	122 So. Michigan Ave.
"	Lespinasse, Victor D.	7 West Madison St.
"	Lieberthal, David	31 No. State St.
"	Loewe, G. M.	108 No. State St.
"	Lydston, G. Frank	815 Reliance Bldg.
"	McKenna, C. M.	2009 Marshall-Field Annex
"	MacMartin, D. R.	20 West Jackson Bldg.
"	Mahoney, J. J.	25 East Washington St.
"	Mowry, A. E.	3505 Indiana Ave.
"	Oliver, M. S.	239 East 51st St.
"	Ormsby, O. S.	25 East Washington St.
"	Orr, H. D.	5 So. Wabash Ave.
"	Rogers, D. W.	2204 So. Michigan Ave.
"	Schmidt, L. E.	5 So. Wabash Ave.
"	Seidler, Leon	29 East Madison St.
"	Senn, W. N.	25 East Washington St.
"	Smejkal, H. J.	3200 West 26th St.
"	Welfeld, Joseph	209 So. State St.
"	White, E. W.	5 S. Wabash Ave.
"	Zurawski, K. A.	32 No. State St.
Effingham	Wettstein, J. C. R.	221 No. 4th St.
Highland Park	O'Neil, John P.	Moraine Hotel

INDIANA.

Evansville	Ehrich, W. S.	4th & Main Sts.
"	Walker, Edwin	712 So. 4th St.

Fort Wayne	Barnett, Charles E.	Gauntt Bldg.
Indianapolis	Eastman, J. R.	331 No. Delaware St.
"	Erdman Bernard	430 Newton-Claypool Bldg.
"	Garshwiler, W. P.	628 Newton-Claypool Bldg.
"	Hamer, H. G.	Hume-Mansur Bldg.
"	McCown, P. E.	623 Hume-Mansur Bldg.
"	Wishard, W. N.	Hume-Mansur Bldg.
Lafayette	Crockett, F. S.	515 Columbus St.
La Porte	Mertz, H. O.	806 Maple Ave.
Terre Haute	McCarthy, F. G.	634½ Wabash Ave.

IOWA.

Hampton	Meyer, H. E.	
Iowa City	Alcock, N. G.	Johnson Co. Bank Bldg.
Sioux City	McLaughlin, A. J.	6th & Pierce Sts.

KANSAS.

Sterling	Trueheart, Marion.	

KENTUCKY.

Lexington	Wheeler, C. L.	Trust Company Bldg.
Louisville	Abell, Irvin	Atherton Bldg.
"	Bloom, I. N.	Atherton Bldg.
"	Bronner, Herbert	Atherton Bldg.
"	Day, G. H.	719 Atherton Bldg.
"	Farbach, H. J.	Atherton Bldg.
"	Frank, Louis	Atherton Bldg.
"	Wathen, J. R.	Gaulbert Bldg.
"	Weber, H. C.	Courier-Journal Bldg.
"	Windell, J. T.	715 West Jefferson St.

LOUISIANA.

New Orleans	Chassaignac, C.	211 Camp St.
"	Kahle, P. J.	305 Baronne St.
"	Nelkin, A.	305 Baronne St.
"	Walther, H. W. E.	Macheca Bldg.

MAINE.

Portland	Mitchell, Alred, Jr.	657 Congress St.

MARYLAND.

Baltimore	Burnam, C. F.	1416 Eutaw Place
"	Geraghty, J. T.	330 No. Charles St.
"	Hunner, Guy L.	2305 St. Paul St.
"	Keidel, Albert	330 No. Charles St.

Baltimore	Kelley, H. A.	1418 Eutaw Place
"	Likes, S. H.	1134 Linden Ave.
"	Rosenthal, M. S.	718 No. Howard St.
"	Rytina, A. G.	312 Professional Bldg.
"	Schoenirch, H.	1134 Linden Ave.
"	Timberlake, Gideon	330 No. Charles St.
"	Walker, George	Charles & Center Sts.
"	Wolf, W. B.	113 West Franklin St.
"	Young, H. H.	Johns Hopkins Hospital

MASSACHUSETTS.

Boston	Allen, Gardner W.	419 Boylston St.
"	Balch, F. G.	279 Clarendon St.
"	Barney, J. D.	99 Commonwealth Ave.
"	Binney, Horace	205 Beacon St.
"	Briggs, F. M.	536 Commonwealth Ave.
"	Brown, Percy	155 Newbury St.
"	Cabot, Hugh	87 Marlborough St.
"	Chase, H. M.	409 Marlborough St.
"	Cheever, D.	355 Marlborough St.
"	Chute, A. L.	350 Marlborough St.
"	Crosbie, A. H.	260 Clarendon St.
"	Cunningham, J. H., Jr.	46 Gloucester St.
"	Davis, Lincoln	205 Beacon St.
"	Howard, H. H.	24 Marlborough St.
"	Lahey, F. H.	638 Beacon St.
"	L'Esperance, O. R. T.	100 Boylston St.
"	Mixter, C. G.	180 Marlborough St.
"	O'Neil, R. F.	379 Beacon St.
"	Pemberton, Frank A.	128 Bay State Rd.
"	Perry, H. J.	45 Bay State Rd.
"	Porter, C. A.	116 Beacon St.
"	Quimby, W. C.	Peter Bent Brigham Hosp.
"	Shapira, Victor I.	252 Huntington Ave.
"	Smith, George G.	99 Commonwealth Ave.
"	Tenney, Benjamin	308 Marlborough St.
"	Thorndike, Paul	24 Marlborough St.
"	Watson, F. S.	92 Marlborough St.
"	Whitney, C. M.	386 Commonwealth Ave.
"	Wiggins, R. C.	510 Commonwealth Ave.
"	Young, E. B.	434 Marlborough St.
"	Young, E. L., Jr.	87 Marlborough St.
Lowell	Halpin, A. J.	22 Central St.
Springfield	Peck, R. H.	15 Temple St.

Worcester	Beal, H. W.	452 Main St.
"	Phelps, O. D.	452 Main St.

MICHIGAN.

Ann Arbor	Loree, I. D.	1st Nat'l Bank Bldg.
Battle Creek	Martin, W. F.	The Sanitarium
Detroit	Cole, F. H.	1515 David-Whitney Bldg.
"	Dodds, J. C.	1505 Kresge Medical Bldg.
"	Fechheimer, H. A.	753 David Whitney Bldg.
"	Keane, W.E.	101 Fort St. West
"	Manton, W. P.	32 Adams Ave. West
"	Martin, W. C.	601 David Whitney Bldg.
"	Plaggemeyer, H. W.	101 David Whitney Bldg.
"	Potter, G. E.	1491 Woodward Ave.
"	Robbins, F. W.	1212 Kresge Medical Bldg.
"	Runo, Herman	David Whitney Bldg.
"	Smith, T. H.	904 Kresge Medical Bldg.
Saginaw	McClinton, N. E.	Weichmann Block

MINNESOTA.

Duluth	Linneman, N. L.	510 Fidelity Bldg.
Minneapolis	Butler, John, Jr.	Pillsbury Bldg.
"	Owre, Oscar	706 Masonic Temple
"	Ten Broeck, Louis L.	Syndicate Bldg.
"	Wright, F. R.	Donaldson Bldg.
Rochester	Braasch, W. F.	Mayo Clinic
"	Thomas, G. J.	Physicians & Surgeons Bldg.
St. Paul	Kelley, W. D.	135 Lowry Bldg.

MISSOURI.

Jefferson Barracks	Ravold, A. N.	
Kansas City	Block, J.	Argyle Bldg.
"	Denslow, F. M.	922 Rialto Bldg.
"	Henderson, J. P.	402 Argyle Bldg.
"	McCallum, F. M.	721 Lathrop Bldg.
"	Mark, E. G.	626 Lathrop Bldg.
"	Smith, Clinton K.	731 Lathrop Bldg.
Springfield	Wills, W. J.	Landers Bldg.
St. Joseph	Bansbach, J. J.	825 Frederick Ave.
"	Elam, W. T.	Corby-Forsee Bldg.
"	Paul, T. M.	King-Hill Bldg.
St. Louis	Bartels, L. G.	1050 Century Bldg.
"	Boehm, J. L.	817 No. 8th St.
"	Boogher, J. Leland	Central Nat'l Bank Bldg.

St. Louis	Burford, C. E.	650 Century Bldg.
"	Caulk, John R.	Humboldt Bldg.
"	Fischel, Ellis	Humboldt Bldg.
"	Garstang, D. Buie	Wall Bldg.
"	Gradwohl, R. B. H.	803 No. Garrison Ave.
"	Greditzer, H. G.	Humboldt Bldg.
"	Jacobson, Henry	429 Cent. Nat'l Bk. Bldg.
"	Kramolowsky, H. H.	650 Century Bldg.
"	Kurtzeborn, Edwin	3532 Washington Ave.
"	Lewis, Bransford	550 Century Bldg.
"	Lund, H. G.	600 Carleton Bldg.
"	Lyon, H. N.	Humboldt Bldg.
"	Marchildon, J. W.	Humboldt Bldg.
"	Martin, Clarence	3700 Morgan St.
"	May, B. F.	Humboldt Bldg.
"	Moore, H. M.	Wall Bldg.
"	Philips, George M.	Commercial Bldg.
"	Pickrell, C. D.	735 Century Bldg.
"	Robertson, W. M.	Humboldt Bldg.
"	Scherck, H. J.	309 Century Bldg.
"	Stewart, Floyd	Chemical Bldg.
"	Suggett, O. LeGrand	704 Metropolitan Bldg.
"	Westerman, C. M.	1345 Syndicate Trust Bldg.
"	Young, H. McClure	600 Carleton Bldg.

NEBRASKA.

Lincoln	Angle, Edward J.	407 Funk Bldg.
Omaha	Hellwig, J. W.	W. O. W. Bldg.
"	McMartin, Charles	419 Brandeis Bldg.
"	Stokes, A. C.	503 Brandeis Bldg.
"	Summers, J. E., Jr.	Brandeis Bldg.
"	Sumney, H. C.	W. O. W. Bldg.

NEW JERSEY.

Bayonne	Woodruff, S. R.	22 West 22d St.
Camden	Lippincott, A. H.	406 Cooper St.
Newark	Furman, B. A.	156 North 7th St.
"	Ill, Edgar A.	1002 Broad St.
"	O'Crowley, C. R.	12 Lombardy St.
"	Patton, J. Allen	Prudential Life Ins. Co.
Newark	Povey, H. Clayton	39 Mott St.
"	Roberts, F. A.	30 East Kinney St.
"	Ward, W. J.	20 Fairmount Ave.

Plainfield	DuBois, F. E.	609 Watchung Ave.
Trenton	Sommer, G. N. J.	120 West State St.

NEVADA.

Reno	Dohl, W. Z.	Masonic Temple

NEW MEXICO.

Albuquerque	Fadeley, F. F.	210½ West Central Ave.

NEW YORK.

Albany	Van der Veer, Jas. N.	28 Eagle St.
Auburn	Laurie, Thomas F.	
Brooklyn	Baketel, H. S.	54 Sidney Place
"	Beers, N. T., Jr.	97 Gates Ave.
"	Cochrane, C. S.	400 Vanderbilt Ave.
"	Harris, B. S.	475 Greene Ave.
"	McCollum, W. E.	1174 Dean St.
"	Morton, H. H.	32 Schermerhorn St.
"	Pentlarge, Victor H.	380 Sterling Place
"	Phillips, Wm. Gray	67 Hansen Place
"	Rathbun, N. P.	442 Greene Ave.
"	Read, J. Sturdivant	174 Clinton St.
"	Thomson, Alex. N.	835 Park Place
"	Weithas, R. C.	813 Halsey St.
Buffalo	Bethune, Chas. W.	520 Franklin St.
"	Carpenter, T. B.	71 North St.
"	Cross, James B.	Niagara Life Bldg.
"	Gardner, James A.	500–505 Electric Bldg.
"	Martin Sergeant P.	Electric Bldg.
"	Slotkin, George B.	49 Niagara St.
Newburg	Snyder, W. H.	202 Grand St.
New Rochelle	Peck, George A.	189 Center Ave.
New York City	Alexion, Alex.	152 East 22d St.
"	Asch, Jos. J.	780 Lexington Ave.
"	Ayres, Winfield	816 Madison Ave.
"	Bandler, C. G.	241 West 102d St.
"	Barringer, B. S.	109 East 34th St.
"	Begg, Colin L.	131 East 17th St.
"	Bierhoff, F.	10 West 61st St.
"	Bissell, J. B.	46 West 55th St.
"	Brodhead, William F.	272 West 119th St.
"	Brouner, Walter B.	27 West 9th St.
"	Buerger, Leo	1000 Park Ave.
"	Bugbee, H. G.	40 East 41st St.

New York City	Caples, B. H.	616 Madison Ave.
"	Chetwood, Charles H.	25 Park Ave.
"	Clark, J. B.	40 East 41st St.
"	Dannreuther, W. T.	2030 Broadway
"	Doyno, Gennora	325 East 17th St.
"	Echeverria, M. J.	60 West 71st St.
"	Eckstein, W. G.	68 West 85th St.
"	Edgerton, F. C.	59 West 58th St.
"	Erdman, John F.	80 West 52d St.
"	Fuller, Eugene	252 Lexington Ave.
"	Furniss, H. D.	45 East 62d St.
"	Geiringer, David	1186 Madison Ave.
"	Goldey, Albert	353 West 57th St.
"	Graeser, Herman R. A.	118 West 111th St.
"	Gray, H. L.	238 West 22d St.
"	Greene, R. H.	78 East 56th St.
"	Hatch, J. L.	30 West 51st St.
"	Hawkes, Forbes	124 East 65th St.
"	Hayden, J. R.	121 West 55th St.
"	Heitzmann, Louis	38 West 90th St.
"	Huhner, Max	320 Central Park, West
"	Hyman, A.	40 East 41st St.
"	Kaufmann, J.	122 East 34th St.
"	Keyes, E. L., Jr.	109 East 34th St.
"	Kilbane, Edward F.	104 West 71st St.
"	Kimball, Cleveland C.	103 East 29th St.
"	Leonard, Veder N.	330 Park Ave.
"	Lowsley, Oswald S.	The Wyoming, 55th St.
"	McCarthy, J. F.	40 East 41st St.
"	McIntyre, H. B.	117 East 62d St.
"	Mason, Frederick	12 Fifth Ave.
"	Meyer, Willy	700 Madison Ave.
"	Monae-Lesser, A.	164 West 72d St.
"	Nordeman, H. F.	65 West 45th St.
"	Osgood, A. T.	40 East 41st St.
"	Pedersen, James	40 East 41st St.
"	Pedersen, Victor C.	45 West 9th St.
"	Porter, W. H.	46 West 83d St.
"	Putnam, C. R. L.	121 East 38th St.
"	Radda, J.	219 East 69th St.
"	Ray Edgar T.	824 St. Nicholas Ave.
"	Reece, H. B.	22 Park Ave.
"	Reynolds, W. S.	132 West 73d St.
"	Rhode, Max S.	The Wyoming, 55th St.

New York City	Robinson, W. J.	12 Mount Morris Park
"	Sasover, Lazar	131 East 115th St.
"	Schapira, S. W.	1847 Madison Ave.
"	Seay, Cornelius J.	111 West 82d St.
"	Sinclair, D. A.	25 Park Ave.
"	Smith, E. E.	50 East 41st St.
"	Smith, Fred'k W.	40 East 41st St.
"	Smith, M. K.	50 East 53d St.
"	Smith, S. B.	160 West 87th St.
"	Squier, J. Bentley, Jr.	49 East 49th St.
"	Stern, Maximilian	219 West 81st St.
"	Stevens, A. R.	40 East 41st St.
"	Stewart, D. H.	128 West 80th St.
"	Strachstein, A.	17 East 38th St.
"	Swinburne, G. K.	64 East 56th St.
"	Tilton, B. T.	15 East 58th St.
"	Townsend, T. M.	171 West 71st St.
"	Valentine, J. J.	171 West 71st St.
"	Van der Poel, John	56 West 52d St.
"	Ware, Martin W. F.	27 East 81st St.
"	Warren, G. W.	117 East 62d St.
"	Whiting, J. R.	17 East 38th St.
"	Wise, Fred	24 West 59th St.
"	Wolbarst, A. L.	113 East 19th St.
"	Wolheim, J. L.	179 East 79th St.
"	Wyeth, G. A.	59 West 54th St.
"	Zigler, M.	40 East 41st St.
Rochester	Morris, R. L.	545 Powers Bldg.
"	Paine, Arthur Hilton	270 Alexander St.
"	Ruggles, E. W.	348 University Ave.
Rome	Reid, W. B.	219 No. Washington St.
Syracuse	Leiter, H. L.	608 East Genesee St.
"	Stark, G. W.	608 East Genesee St.
"	Wose, A. M.	East Genesee St.

NORTH CAROLINA.

Charlotte	Crowell, A. J.	Realty Bldg.

NORTH DAKOTA.

Bismarck	LaRose, V. J.	City Nat'l Bank Bldg.

OHIO.

Cincinnati	Heidingsfeld, M. L.	19 West 7th St.
"	Koch, A. E.	Union Central Bldg.

Cincinnati	McKim, G. F.	Union Central Bldg.
"	Ravogli, A.	5 Garfield Place
"	Ricketts, B. Merrill	Cor. 4th & Broadway
"	Smith, E. O.	19 West 7th St.
"	Staley, R. W.	63 Groton Bldg.
"	Webb, Dudley	409 Broadway
Cleveland	Harsh, E. H.	Osborn Bldg.
"	Herrick, F. C.	465 Rose Bldg.
"	Lower, W. E.	222 Osborn Bldg.
"	Oakley, Frank	432 Anisfield Bldg.
"	Sanford, H. L.	207 Osborn Bldg.
"	Seward, I. E.	606 Osborn Bldg.
"	Shupe, T. P.	222 Osborn Bldg.
Columbus	Bratton, H. O.	112 East Broad St.
"	Landrum, A. B.	246 East State St.
"	Youmans, T. G.	1242 Neil Ave.
Dayton	Coleman, C. A.	972 Reibold Bldg.
"	Evans, G. B.	17 So. Wilkinson St.
Toledo	Harpster, C. M.	Wedgewood Bldg.
"	Jacobson, J. H.	421 Michigan St.
"	Keller, J. G.	326 Ohio Bldg.
"	McGonigle, M. B.	237 Michigan St.
"	Walker, R. S.	503 Nicholas Bldg.
"	Willoughby, L. A.	306 Wayne Bldg.
Youngstown	Elder, Jas. F.	Stambaugh Bldg.

OREGON.

Portland	Howard, H. W.	900 Journal Bldg.
"	MacKay, A. E.	700 Oregonian Bldg.
"	Whiteside, G. S.	907 Journal Bldg.

PENNSYLVANIA.

Harrisburg	Traver, S. N.	128 Locust St.
Philadelphia	Alexander, E. G.	1627 Oxford St.
"	Birdsall, J. C.	116 So. 19th St.
"	Bonney, C. W.	1117 Spruce St.
"	Brooks, Macy	1314 Spruce St.
"	Christian, H. M.	1321 Spruce St.
"	Dehoney, Howard	240 So. 13th St.
"	Gans, S. L.	1809 Chestnut St.
"	Hirsch, C. S.	900 Pine St.
"	Kinney, W. H.	124 So. 18th St.
"	Loux, H. R.	1819 Walnut St.

Philadelphia	Lownes, J. B.	1849 No. 19th St.
"	MacKinney, W. H.	1701 Chestnut St.
"	Martin, Edward	1506 Locust St.
"	Moorehead, S. W.	1506 Locust St.
"	Muellerschoen, G. J.	1727 No. 15th St.
"	Neilson, T. R.	1937 Chestnut St.
"	Pilling, G. P., Jr.	4044 Chestnut St.
"	Randall, Alexander	Professional Bldg.
"	Siter, E. H.	1818 So. Rittenhouse Sq.
"	Stellwagen, Thos. C., Jr.	1831 Chestnut St.
"	Thomas, B. A.	116 So. 19th St.
Pittsburgh	Anderson, Robert L.	7133 Jenkins Arcade
"	Baker, Theodore	Jenkins Arcade
"	Bryant, W. C.	Jenkins Arcade
"	Burt, J. C.	Westinghouse Bldg.
"	Disque, T. L.	707 Jenkins Arcade
"	Hankey, S. M.	7070 Jenkins Arcade
"	Hawkins, J. A.	6126 Jenkins Arcade
"	Holliday, G. A.	Jenkins Arcade
"	Murphy, A. I.	Westinghouse Bldg.
"	Murphy, A. I.	Westinghouse Bldg.
"	Ohlman, I. L.	8122 Jenkins Arcade
"	Schmid, Henri	707 Jenkins Bldg.
"	Stewart, Acheson	Keenan Bldg.

RHODE ISLAND.

Providence	Cooke, C. O.	251 Broad St.
"	Corrigan, H. J. C.	242 Broadway
"	Gifford, N. H.	13 Greene St.
"	Jones, A. T.	214 Benefit St.
"	Keefe, J. W.	262 Blackstone Blvd.
"	Kingman, Lucius C.	76 Waterman St.
"	Matteson, G. A.	276 Benefit St.
"	Pitts, H. C.	221 Thayer St.
"	Smith, E. B.	76 Waterman St.
"	Terry, H.	97 Broad St.

SOUTH CAROLINA.

Charleston	Baynard, E. C.	82 Society St.

TENNESSEE.

Memphis	Livermore, G. R.	1308 Exchange Bldg.
Nashville	Anderson, C. F.	Eve Bldg.
"	Bromberg, Perry	315 Jackson Bldg.

Nashville	Hall, John .....37 Clarendon Apts.
"	Handley, J. W. ....714 1st Nat'l Bank Bldg.
"	Simons, Irving .....178 8th Ave., North

TEXAS.

Dallas	Dean, J. H. .....301 Wilson Bldg.
"	Folsom, A. I. .....704 Wilson Bldg.
"	Shelmire, J. B. .511 Southwestern Life Bldg.
El Paso	Jamieson, W. R. .....Mills Bldg.
San Antonio	Johnson, H. McC. .Suite 222, Moore Bldg.
"	Walsh, F. C. .....Moore Bldg.
Waco	McGlasson, I. L. .....223 Peerless Bldg.

VERMONT.

Rutland	Townsend, W. W.

VIRGINIA.

Norfolk	Hirschler, D. Lee .....Dickson Bldg.
Richmond	Bosher, L. C. .....422 East Franklin St.
"	Bryan, R. C. .....Grace Hospital
"	Price, L. T. .....301 East Franklin St.

WASHINGTON.

North Yakima	Brush, F. H. .....310 Masonic Temple
Seattle	Ashton, F. L. .....614 American Bank Bldg.
"	Peterkin, G. Shearman ....1102 Cobb Bldg.

WEST VIRGINIA.

Parkersburg	Barker, Oliver D. .....5th and Market St.
Wheeling	Hupp, F. L. .....61 14th St.

WISCONSIN.

Milwaukee	Fletcher, E. A. .....128 Wisconsin St.
"	Hayes, D. J. .....1403 Majestic Bldg.
"	Jenner, A. G. .....1st Nat'l Bank Bldg.

CANADA.

Montreal	Irvine, A. D. .....Linton Apts.
"	Lauterman, M. .....196 Peel St.
"	MacKenzie, D. W. Royal Victoria Hospital
Vancouver, B. C.	Gordon, G. S. .....502 Birks Bldg.
Winnipeg, Man.	Fletcher, R. D. .....Somerset Bldg.

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